FOR THE PEOPLE
FOR EDVCATION
FOR SCIENCE

LIBRARY
OF
THE AMERICAN MUSEUM
OF
NATURAL HISTORY

THE

VICTORIAN NATURALIST:

THE JOURNAL & MAGAZINE

OF THE

Field Naturalists' Club of Victoria.

VOL. XXX.

MAY, 1913, TO APRIL, 1914.

Hon. Editor: MR. F. G. A. BARNARD.

The Author of each Article is responsible for the facts and opinions recorded.

Melbourne:
WALKER, MAY & CO., PRINTERS, MACKILLOP STREET
(OFF 390 LITTLE COLLINS STREET).
1914.

-15.67830 July 29

THE VICTORIAN NATURALIST.

VOL. XXX.

MAY, 1913, to APRIL, 1914.

CONTENTS.

FIELD NATURALISTS' CLUB OF VICTORIA:— PAGE

Annual Report - - - - - - 45

Exhibition of Wild-Flowers - - - 116, 134

Proceedings 1, 25, 45, 61, 81, 97, 113, 129, 145, 169, 193, 217

Reports of Excursions - 1, 25, 26, 29, 35, 45, 61, 81, 98, 113, 114, 118, 119, 129, 130, 135, 145, 169, 195, 220, 221

ORIGINAL PAPERS.

BAKER, R. T., F.L.S.—On a New Variety of *Eucalyptus globulus—E. globulus*, var. *St. Johni* (with plate) - 127

BASTOW, R. A.—Notes on the Lichen-Flora of Victoria (with plate) - - - - - - 175

CHAPMAN, F., A.L.S.—Victorian Fossiliferous Limestones and their Correlatives in Other Lands - - 139

CHAPMAN, F., A.L.S.—On the Occurrence of the Cainozoic Shark, *Carcharoides*, in Victoria (with figure) - 142

D'ALTON, ST. ELOY, C.E.—The Botany of the "Little Desert," Wimmera, Victoria (with map) - - 65

DOYLE, GERALD V.—A Note on Parturition in Perameles - 214

GABRIEL, J.—The Incubation of the Mutton-bird Egg - 226

GATLIFF, J. H., and GABRIEL, C. J.—List of Recent Victorian Brachiopoda (with plate) - - - 210

GOUDIE, J. C.—Notes on the Coleoptera of North-Western Victoria, part v. - - - - - 189

HARDY, A. D., F.L.S., F.R.M.S.—Some Algæ of the Zoological Gardens, Melbourne (with plate) - - 89

HARDY, A. D., F.L.S., F.R.M.S.—The Mallee—Ouyen to Pimaroo (with plate and map) - - - 148

HART, T. S., M.A., B.Sc.—Some Coastal Plants: their Shelter and Fire Danger - - - - - 222

PAGE

KEARTLAND, G. A.—Notes on the Zoology of the Great Desert of North-Western Australia - - - 40

KELLY, REGINALD.—Observations on the Function of Acacia Leaf Glands - - - - - 121

KERSHAW, J. A., F.E.S.—Additions to the Fish Fauna of Victoria, iv. (with plate) - - - - 95

MAY, W. L.—On Some Investigations into the Molluscan Fauna of the Furneaux Group - - - 55

PITCHER, F.—Some General Remarks on Ferns, with Special Reference to Victorian Species - - - 5

SEARLE, J.—An Addition to the Victorian Fresh-water Copepoda (with plate) - - - - - 191

SARGENT, OSWALD H.—A Westralian Form of the Orchid *Prasophyllum australe* - - - - 86

WILLIAMSON, H. B.—Botanical Notes of a Trip to Mildura - 101

INDEX.

PAGE

Acacia discolor - - - 4
Acacia, Function of Leaf Glands - - - 121
Algæ, Fresh-water - 53, 89
Alphington, Excursion to - 129
Amathia tortuosa - - 29
Amytornis rufa - - - 4
Ants, Military Tactics of - 78
Aster celmisia - - - 195
Austral Avian Record 80, 112, 147
"Australasian Fossils" - 227
Australia, Zoology of North-Western - - - 40
Australian Crayfishes - - 79
Australian Trees and Shrubs in Ireland - - - 111
Avicennia officinalis - - 28
Bage, Miss Freda, M.Sc. - 147
Baker, R. T., F.L.S., New Variety of *Eucalyptus globulus*, var. *St. Johni* - 127
Balwyn, Excursion to - 35
Baw Baw, Excursion to 198, 220
Beaumaris, Excursion to - 130
Bees and Pollen - - - 132
Beetle and Frog - - 171
Bell-birds - - - - 194
Bird Day - - - - 112
Bird Nomenclature - - 60

PAGE

Bird Protection - 25, 83, 111, 113, 169
Birds, Cruelty to - - 217
Birds of Phillip Island - 33
Blackburn, Excursion to - 114
Blackfish in Queensland - 171
Blue Gum, Large Leaves of 64
Boeckella usymmetrica - - 191
Boobialla - - - - 224
Botanical Gardens, Visit to - 130
Botanical Notes in Mallee 148, 173
Botany of "Little Desert" - 65
Botany of Mildura - - 101
Brachiopoda, Recent Victorian - - - - 210
Brachiopods, Victorian - 172
Butterfly Farm, A - - 134
Carcharoides tenuidens - - 142
Ceratium - - - - 195
Chapman, A., F.L.S., A Cainozoic Shark, Fossil, in Victoria - - - 142
Chapman, F., A.L.S., Victorian Fossiliferous Limestones - - - 139
Cheltenham, Excursion to 26, 113
Coastal Plants: their Shelter Value and Fire Danger 222

PAGE
Coburg, Excursion to - - 45
Coleoptera of North-Western Victoria - - - 189
Copepoda, A New Fresh-water - - - - 191
Coral-trees in Botanical Gardens - - - 144
Crayfishes, Fresh-water - 79
Crayfishes, Land - - 79
Cryptomeria japonica - - 63
D'Alton, St. Eloy, C.E., Botany of "Little Desert" - - - 65
Doyle, G. V., Note on Parturition in Perameles - 214
Drakea irritabilis - 25, 44
Eltham, Excursion to - 1
Entomology, Economic - 4
Erythrinas or "Coral-trees" 144
Eucalyptus Considiniana - 1
Eucalyptus Delegatensis - 193
Eucalyptus globulus - - 64
Eucalyptus globulus, var. *St. Johni* - - - - 127
Eucalyptus nitens - - 193
Eucalyptus polyanthema - 1
Eucalyptus rubida - - 1
Eudyptula minor - - 34
Exocarpus cupressiformis, Seedling of - - - 28
Ferns - - - - 5
Ferns, Distribution of - 21
Fielder, The Late Rev. W. - - - - - 36
Field Naturalists' Club of Victoria—
Annual Report - - 45
Excursions —
Alphington - - - 129
Baw Baw - - 198, 220
Beaumaris - - - 130
Blackburn - - - 114
Botanical Gardens - 130
Cheltenham - - 26, 113
Coburg - - - 45
Eltham - - - 1
Frankston - - - 81
Heidelberg - - - 221
Hurst Bridge - - 98
Maribyrnong Bridge 25, 61
Mitcham - - - 98
Monegatta North - 61
Mont Albert and Balwyn 35
Mooroolbark - - 145
Phillip Island - - 29
PAGE
Excursions—
Point Cook - - - 118
Ringwood - - - 129
Royal Park - - - 45
Sandringham - - 169
Werribee Gorge - - 135
Whittlesea - - - 119
Exhibition of Wild-Flowers 116, 134
Financial Statement - 51
Junior Membership - 82, 97
Office-bearers, 1913-14 - 52
Proceedings, 1, 25, 45, 61, 81, 97, 113, 129, 145, 169, 193, 217
"Fifty Miles Round Melbourne" - - - 144
Fish, A New Victorian - 95
Fishing-lines at Yering Gorge - - - - 114
Forestry in Switzerland - 168
Fossiliferous Limestones - 139
Fox Farming in Canada - 143
Frankston, Excursion to - 81
Frog and Beetle - - - 171
Furneaux Group, Mollusca of - - - - - 55
Gadopsis marmoratus - - 171
Gatliff, J. H., and Gabriel, C. J., Recent Victorian Brachiopoda - - 210
Geology in Railway Cuttings 170
Goudie, J. C., Coleoptera of North-Western Victoria 189
Grampians Revisited, The - 219
Grass-Wren, A New - - 4
Hakea laurina - - - 28
Hardy, A. D., F.L.S., Algæ of Zoological Gardens, Melbourne - - - - 89
Hardy, A. D., F.L.S., The Mallee: Ouyen to Pinnaroo - - 148, 173
Hart, Mr. T. S., M.A. - 39
Hart, T. S., M.A., Coastal Plants: their Shelter Value - - - - 222
Healesville, &c., Map of - 167
Heidelberg, Excursion to - 221
Honey-eater and Cuckoo - 174
Hurst Bridge, Excursion to 98
Incubation of Mutton-bird Eggs - - - - 226
Insects, Timber-boring - 112
Ireland, Australian Trees in 111

PAGE
Keartland, G. A., Zoology of Great Desert of North-Western Australia - 40
Kelly, Reginald, Function of Acacia Leaf Glands - 121
Kershaw, J. A., F.E.S., Additions to Fish Fauna of Victoria - - - 95
Kitson, Mr. A. E. - 26, 37
Lampris luna, Gmelin - 95
Laughing Jackasses - - 115
Leach, Dr. J. A. - - 81
Limestones, Victorian Fossiliferous - - - 139
"Little Desert," The Botany of - - - - - 65
Lorne, Map of - - - 167
Love-bird - - - - - 99
Lyre-birds, Notes on Victoria - - - - 218
Mallee, Trip in - - 148, 173
Mangrove, Flower of False - 28
Manorhina melanophrys - 194
Maplestone, The late Chas. 196
Maribrynong Bridge, Excursion to - - 25, 61
Mattingley, A. H. E. - - 147
May, W. L., Molluscan Fauna of Furneaux Group - - - - 55
Microscopical Society of Victoria - - - 60
Mildura, Botanical Notes at 101
Mitcham, Excursion to - 98
Modiola victoriæ - - - 29
Mollusca, Freshwater - - 28
Mollusca of Furneaux Group 55
Mooroolbark, Excursion to - 145
Monegatta North, Excursion to - - - 61
Mont Albert, Excursion to - 35
Morrison, The Late Dr. A. - - - - - 145
Mouse, Curious Nest of - 64
Murray Pine, A Plea for - 110
Mutton-birds 2, 27, 31, 167, 219
Myoporum insulare - - 224
National Park, Wilson's Promontory - - 1, 2
Natural History of Southern Nigeria - - - 37
"Nests and Eggs of Birds Found Breeding in Australia" - - - 80
Nicholls, Mr. E. Brooke - 39
PAGE
Nigeria, Southern: its Natural History - - - 37
Nomenclature of Birds - 60
O'Donoghue, J. G., Notes on Lyre-birds - - - 218
Opah, The - - - - 95
Opossum - - - - 100
Orchid, A Hybrid - - 64
Orchid, *Drakea irritabilis* - 25
Orchid, *Prasophyllum australe* - - - - 54
Ouyen to Pimaroo - 148, 173
Perameles obesula - - 214
Phillip Island, Excursion to 29
Pitcher, F., Remarks on Ferns - - - - 5
Plant, A Unique - - 138
Plants, Introduced 28, 54, 85
Point Cook, Excursion to - 118
Pollen and Bees - - - 132
Pond-life at Brisbane - - 85
Prasophyllum australe - - 86
Prasophyllum flavum - - 220
Prasophyllum Suttoni - - 195
Rabbit Destruction - - 111
Rocking Stone, A - - 115
Royal Park, Excursion to - 45
Sargent, O. H., Westralian Form of *Prasophyllum australe* - - - 86
Searle, J., Addition to Victorian Fresh-water Copepoda - - - - 191
Shark, A Cainozoic - - 142
Sleeper, G. W., Pamphlet by 193
"Some Familiar Wild-Flowers" - - - 168
Spencer, Prof., C.M.G. - 218
Stout, Mr. C. - - 2, 34
Switzerland, Forestry in - 168
"The Cabinet Timbers of Australia" - - - 100
Thelymitra venosa - - 195
Timber-boring Insects - 112
Tourist Maps — Lorne, Healesville, &c. - - 167
Tree-planting - - - 4
Tunicate, A Pelagic - - 100
Victorian Brachiopoda, Recent - - - 210
Victorian Copepoda - - 191
Victorian Ferns - - - 5
Victorian Fish Fauna - - 95
Victorian Fossiliferous Limestones - - - 139

PAGE

Victorian Plants, Common Names for - - 64, 197
Warburton, Map of - - 167
Wasps' Nests - - - 228
Whittlesea, Excursion to - 119
Wild Flowers, Exhibition of 116, 134
"Wild Flowers of New South Wales" - - - 80
Williamson, H. B., Botany of Mildura - - - 101
Woolamai, Cape - - 30
Zoology, North-West Australia - - - - 40

ILLUSTRATIONS.

PAGE

Algæ, Fresh-water - - - - - - 95
Boeckella asymmetrica - - - - - - 192
Eucalyptus globulus, var. *St. Johni* - - - - 128
Lichens, Typical Victorian - - - - - 186
"Little Desert," Map of - - - - - 65
Little Penguin, Nest and Young - - - - 34
Magellania flavescens - - - - - - 212
Mallee, Map of - - - - - - - 167
Mallee Salt Lake, Diagram of - - - - - 166
Mallee Scenes - - - - - - - 166
Phillip Island and Western Port, Map of - - - 29
The Opah, *Lampris luna* - - - - - 96
Volcanic Plug, Balwyn - - - - - - 36

CORRECTIONS.

Vol. XXIX.—Page 189, line 23—For "*cyanocephala*" read "*cygnocephala*."

Vol. XXX.—Page 81, line 2—For "14th" read "11th."

Page 114, line 34—For "*tortuserratus*" read "*totuserratus*."

Page 172, lines 5 and 6—For "classed among the Breams" read "considered as allied to the Blennies."

Page 193, line 35—For "Steeper" read "Sleeper."

The Victorian Naturalist.

Vol. XXX.—No. 1. MAY 8, 1913. No. 353.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 14th April, 1913.

The president, Dr. J. A. Leach, occupied the chair, and about 45 members and visitors were present.

CORRESPONDENCE.

From Mr. J. A. Kershaw, F.E.S., secretary of the Committee of Management of the National Park, Wilson's Promontory, acknowledging the Club's protest against the further use of the National Park as a grazing area on account of the danger of the destruction of the native flora, and stating that the Committee has directed that all stock shall be removed from the Park after June, 1913.

REPORTS.

A report of the excursion to Eltham on Saturday, 12th April, was given by the leader, Mr. P. R. H. St. John, who reported that, favoured by a fine afternoon, there was a good attendance of members. The outing had been arranged for the study of eucalypts, which are well represented in the district. Following the main road towards Research for about a mile a northerly direction was taken to one of the last remaining specimens of the Yertchuk, *Eucalyptus Considiniana*, which appears to have been highly prized by local residents as a source of fencing material. A number of trees and saplings of the Red Box, *E. polyanthema*, were pointed out, while the clean, white stems of the Candlebark, *E. rubida*, were prominent in several directions. Altogether, at least a dozen species of eucalypts were seen. During an interval for rest a few notes were read on the history of the genus and the various schemes suggested for the separation of the species.

A report of the junior gathering at the Royal Society's Hall on Saturday, 5th April, was given by the leader, Mr. A. D. Hardy, F.E.S., who said that the afternoon had been scheduled for the examination of microscopic objects, and, although a special effort was made to attract the juniors by means of circulars, the attendance was very poor. The plan of operation was to address the members for a short time, giving a rough outline of the afternoon's work, and then, with five microscopes, show various exhibits, zoological and botanical—living

as well as permanent mounts. In this work he was assisted by Miss J. Raff, M.Sc., whilst the microscopes were kindly supplied by Messrs. Watson and Sons.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. Henry Whitmore, 8 Trafalgar-road, Camberwell, was duly elected an ordinary member; and Mr. F. J. Harvey, 33 Aphrasia-street, Bareena, Geelong, and Mr. Alex. Purnell, Talbot-street, Bareena, country members of the Club.

GENERAL BUSINESS.

Mr. F. G. A. Barnard, referring to the decision of the Committee of Management of the National Park to cancel all grazing leases in the Park, said that the committee should have the very best thanks of the Club for carrying out its desire. He hoped that by so doing they would not have to curtail expenditure and thus stop further improvements from being carried out for some time.

Mr. J. A. Kershaw, F.E.S., stated that the committee would lose £180 per year as a result of its action.

Mr. F. Wisewould said it would be interesting to know what action the Government proposed to take. It was a National Park, and he thought that an effort should be made to stir up the general public to a sense of responsibility, instead of leaving it to a few to provide the necessary funds.

Mr. J. A. Kershaw remarked that at present the Government granted £500 per year, practically the whole of which is absorbed in making improvements.

Mr. F. G. A. Barnard moved that a vote of thanks be accorded to Messrs. Watson and Son for providing microscopes at the junior meeting on 5th April. The motion was seconded by Mr. F. Pitcher, and carried unanimously.

Mr. H. E. Horner stated that while on a visit to Port Campbell recently several cases of Mutton-bird shooting had come under his notice, and he asked if this were allowed under the Game Laws.

Mr. J. Gabriel said that rookeries were protected, but not the Mutton-birds.

Mr. J. A. Kershaw spoke in appreciation of the work done by Mr. C. Stout while secretary for juniors, and moved that the best thanks of the Club be forwarded to him.

This was seconded by Mr. F. Pitcher, and carried unanimously.

PAPERS READ.

1. By Mr. W. L. May (communicated by Mr. A. H. E. Mattingley, C.M.Z.S.), entitled "On Some Investigations into the Molluscan Fauna of the Furneaux Group."

The author gave some notes of a few days' collecting during November, 1912, among the islands of the Furneaux Group, at the eastern entrance to Bass Strait. The species observed numbered 152, but probably many more could have been added had time permitted. The locality is the meeting-place of the molluscan faunas of south-eastern Australia and northern and eastern Tasmania, and representatives of each fauna were present. The only endemic species obtained peculiar to the islands was a land snail.

Mr. J. H. Gatliff (who read the paper, in the absence of the author) and Mr. C. J. Gabriel made some remarks concerning some of the species mentioned.

2. By Mr. St. Eloy D'Alton, C.E., entitled "The Botany of the Little Desert, Western Wimmera, Victoria."

The author gave an interesting description of the flora of the "Little Desert," a tract of sandy country lying to the west of Dimboola and south of the Adelaide railway. Though an apparently dry, sandy area, the variety of plants and shrubs to be met with is very striking. Many are comparatively rare and confined to the district, while others have an extensive range through other parts of the State. He thought that plant-lovers would find much to interest them were they to spend a few days visiting the more accessible parts of the desert.

Mr. F. G. A. Barnard congratulated the author on his paper, and said that he was probably one of the best field workers we have in Victoria. He remarked on the number of plants mentioned by the author which were well known in localities around Melbourne.

Dr. T. S. Hall, M.A., in commenting on the paper, mentioned having passed through similar desert country south of Wolseley, South Australia, some years ago. He was struck with its likeness to Sandringham coastal type of country.

Mr. F. Pitcher said that the value of the paper lay in that a certain part of the State had been botanically mapped, and he hoped that the whole State would be worked in this way. If this paper were compared with Dr. Sutton's "Sandringham Flora" a large number of the plants would be found to be common to both.

Dr. Leach said it was valuable to have such records. He had driven recently along the Upper Murray River, and was surprised to note how the native plants were being displaced by the poorest of European weeds.

NATURAL HISTORY NOTE.

Mr. J. C. Goudie contributed a note on the behaviour of two kinds of ants when irritated.

EXHIBITS.

By Mr. F. G. A. Barnard —Sunshine Wattle, *Acacia discolor*, collected at Walhalla on Easter Saturday, 1913.

By Mr. F. Cudmore.—Nautilus, sp., from the Balcombian beds of Mornington ; collected on 13th April, 1913.

By Mr. C. J. Gabriel.—*Argonauta argo*, Linn., from Japan.

By Mr. J. E. Dixon.—Coleoptera from Tallangatta, North-Eastern Victoria, including *Byallus reticulata*, Pasc., *Saragus incisus*, Pasc., *Notonomus Gippsiensis*, Cast., &c. ; also wasp, *Polistes tricolor*, and nests, from Wodonga.

By Mr. J. T. Hamilton, F.L.S. — Hawkesbury sandstone (Triassic), from Narrow Neck, Blue Mountains, N.S.W.

By Mr. H. E. Horner.—Rock through which the roots of a tree have grown ; collected at Port Campbell.

By Mr. G. A. Keartland. — Marsupial mice, *Sminthopsis crassicaudata*, from Sunbury.

By Mr. J. A. Kershaw, F.E.S. (for National Museum).— Type and co-type of a new Grass-Wren, *Amytornis rufa*, Kershaw and Campbell, collected by Mr. G. F. Hill on Capt. Barclay's expedition, Northern Territory.

By Mr. F. Pitcher (for Curator, Botanical Gardens). — Specimens in bloom of *Eucalyptus leucoxylon*, var. *macrocarpa*.

By Mr. J. Searle.—Collection of fish and crustacea, dredged in Corio Bay.

By Mr. F. Spry.—Chalcid, *Eucharis larymna* (?), Walk., bred from pupa of ant, *Myrmecia forficata*, Fab., obtained at Ferntree Gully, 20th March, 1913.

By Mr. C. Stout.—Photographs taken at junior excursion, Elwood, 1st February, 1913.

After the usual conversazione the meeting terminated.

Tree-Planting.—The *Journal of Agriculture* (Victoria) for April contains a useful article by Mr. J. R. Tovey, of the National Herbarium, on tree-planting for shelter, shade, or wind-breaks. Lists of trees and shrubs are given, both native and exotic, which are useful for different situations and localities in Victoria.

Economic Entomology.—Mr. C. French, jun., Government Entomologist, has, at the request of the Tasmanian Government, been sent to Tasmania to examine and report on the damage to timber by borer beetles.

Correction.—In line 23 on page 189 of the April *Naturalist*, for "*cyanocephela*" read "*cygnocephala*." Will readers add this correction to the errata and index issued with the last number ?

SOME GENERAL REMARKS ON FERNS, WITH SPECIAL REFERENCE TO VICTORIAN SPECIES.

By F. PITCHER.

(*Read before the Field Naturalists' Club of Victoria, 10th March*, 1913.)

NOTWITHSTANDING the interesting and instructive description of Victorian ferns which formed the valuable series of papers given before this Club in its infancy by Mr. Chas. French, sen., one of the Club's founders (published in the *Southern Science Record*, 1880–82), and although technical records of our native ferns are to be found in the "Key to Victorian Plants," since published by the late Baron Sir F. von Mueller, it has been thought that there is still room to put together, in one paper, some notes regarding ferns generally, and having special reference to our local species, which might be of further value and interest to present members as well as to readers of the *Naturalist*.

Some divisions, orders, and genera of plants stand out so prominently in the vegetable kingdom as to be easily recognized by the most casual observers, be they adults or juniors. Such, for instance, are palms, pines, so-called gum-trees or eucalypts, orchids, grasses, rushes, and ferns. Ferns, however, are so strikingly distinctive that very few Victorians, at any rate, are unable to at once recognize as ferns the majority of the native species. This may be accounted for owing to the beauty and the delicacy of their foliage, their distinctive mode of leaf or frond development, and the arrangement of their reproductive organs. It may also be, in a measure, owing to the abundance of so many tree and other ferns in the innumerable valleys along our creeks and rivers and on the slopes of our many mountain ranges.

WHAT ARE FERNS?

All plants are separable into one of the two great divisions of the vegetable kingdom—viz., phanerogams or cryptogams —*i.e.*, those with or without flowers. Ferns are included in the division of cryptogams, having no real flowers, their organs of reproduction being obscure.

They may be described as plants without true leaves, consisting of a rhizome or rooting stem, or simple trunk, emitting either alternate or a terminal tuft of more or less leaf-like fronds; the fruit, known as spores, is borne on the under surface or margin of the fertile fronds, which are sometimes very narrow, and resemble simple or branched spikes.

The different parts of ferns may be separately explained thus :—

1.—*Roots.*—These consist of a mass of delicate fibrous tissues by which the plants are able to extract moisture and nutriment from the soil. They may assume the same form as in ordinary plants, or that of a creeping stem, known as a rhizome, developing roots at various stages.

2. *Stems.*—These may assume an aborescent habit in the form of a trunk, which may increase in height, according to the lengthened continuance of its summit growth, from two to sixty or eighty feet; or herbaceous habit, on a plan similar to the aborescent kinds, but on a smaller scale; or the form of a fleshy rhizome.

3. *Fronds.*—These may be either alternate or in the form of a terminal tuft. They consist of a stalk, known as the stipe (or undivided, unbranched portion) or rachis (branched or divided portion), and bearing simple or variously divided or compound laminum, pinnæ, or pinnules. When young the fronds of all ferns, except in the case of Ophioglossum, are rolled inward, termed circinate.

4. *Fruit.*—This consists of spores contained in a spore-case or sporangium, borne, as previously mentioned, in spots or lines or masses in collective clusters or patches known as sori, which, at times, are covered with a thin membrane called the indusium. From spores are developed young ferns. So far as the work of the Great Designer has been able to be interpreted, it is found that at the early stage of the germination of the spore there arises from it a green, leaf-like expansion called a prothallium. This, examined microscopically, reveals, on its under hairy surface, cellular bodies of two distinct kinds, the more numerous rounded ones, called antheridia, and the long, spindle-shaped ones, archegonia, which are equivalent to the stamens and pistils of flowering plants. Subsequently, the young plants arise, apparently from the prothallium.

Number and Distribution of Ferns.

The total number of species of ferns, admitted and described by Messrs. Hooker and Baker in their work, "Synopsis Filicum," published in 1863, was 2,235. Carl Christensen, in his "Index Filicum," recently published, enumerates 5,950 species, representative of 149 genera.

Bentham and Mueller, in the "Flora Australiensis," recognized 38 genera of Australian ferns, of which 29 have a general range over the Old and the New World, 5 have a wide distribution over the Old World, 3 are confined to New Zealand and the Pacific islands, while only one genus is endemic—viz., Platyzoma. This genus, which has only one species, *P. microphyllum*, has, however, since been included by Baron von

Mueller, in the "Census of Australian Plants," in the Gleichenia family, under *G. platyzoma*. In this work the number of Australian species is given as 212, of which 183 are to be found in Queensland, 131 in New South Wales, 69 in Victoria,* 39 in Tasmania, 29 in South Australia, and 11 in Western Australia.

There is no species endemic to Victoria. Two species, *Cyathea Cunninghami* and *Aspidium hispidum*, are, however, only found in Tasmania and Victoria, *Asplenium Hookeranium* only in New South Wales and Victoria, and 14 other species are only found in two other States and Victoria. The following six species are recorded in all the other States as well as Victoria, viz. :—*Adiantum Æthiopicum*, *Asplenium flabellifolium*, *Cheilanthes tenuifolia*, *Grammitis rutæfolia*, *Lindsaya linearis*, and *Pteris aquilina*.

In a full list, alphabetically arranged, which is appended, is given the geographical distribution of each of our native ferns,

Classification of Ferns.

Although a large number of ferns, and the majority of our Victorian species, are readily distinguishable from one another by their mode of development and the forms assumed by their frondage. it is necessary for their arrangement botanically that some feature should be used as a basis for their classification. While several schemes have been suggested, the principal ones are those based upon the general habits of the plants, and the formation, position, arrangement, and development of their reproductive organs.

Hooker's "Synopsis Filicum" divides the Order into six sub-orders, as follow :—1, Gleicheniaceæ : 2, Polypodiaceæ (with 13 sections known as "tribes") ; 3, Osmundaceæ ; 4, Schizaceæ ; 5, Marattiaceæ ; and 6, Ophioglossaceæ. The classification in Christensen's recently published work, the author states, is based principally upon that of Messrs. Engler and Prantl, which divides the Order into twelve families, in the following sequence, viz. :—1, Hymenophyllaceæ ; 2, Cyatheaceæ ; 3, Polypodiaceæ ; 4, Parkeriaceæ ; 5, Matonaceæ ; 6, Gleicheniaceæ ; 7, Schizæaceæ ; 8, Osmundaceæ ; 9, Salviniaceæ ; 10, Marsileaceæ ; 11, Marattiaceæ ; 12, Ophioglossaceæ. Bentham and Hooker, in their "Flora Australiensis," group the ferns therein enumerated under six tribes, viz. :—1, Ophioglosseæ ; 2, Marattieæ ; 3, Osmundeæ ; 4, Hymenophylleæ ; 5, Cyatheæ ; 6, Polypodieæ. This last-mentioned classification is used in the following general

* In the "Recording Census of Victorian Plants" (1908), prepared under the direction of Professor Ewart for the Plant Names Committee of the Club, 73 species are enumerated.

description of the whole of our Victorian ferns, among which are representatives of each tribe.

VICTORIAN FERNS.

I have included the whole of the 73 species mentioned in the list before referred to, and classified the species there enumerated according to their places among these tribes.

The first tribe, Ophioglosseæ, is distinguished by their fronds not being circinate or gyrate, as in all other ferns : the sterile ones like ordinary leaves, the fertile ones like spikelets, simple or compound. Spore-cases globular, two-valved, without ring, sessile, in two rows.

Two genera are represented in Victoria—viz., Ophioglossum (which is the type plant) and Botrychium. One species of the former, *O. vulgatum*, a little plant seldom reaching six inches in height, and known as the Adder's Tongue Fern, is familiar to collectors. It was formerly to be found in moist ground in the eastern and southern districts around Melbourne, and is also found in Gippsland, Fernshaw, and Grampians.

Of Botrychium there are two species—*B. lunaria*, Common Moonwort, and *B. ternatum*, Meadow Moonwort. Both are small plants, generally not exceeding 8 or 9 inches high, and difficult to distinguish from surrounding vegetation unless closely searched for. The latter species has its fertile panicle broader than the former. These plants, although recorded from upland districts, principally in the open forest land, have also been found in the vicinity of Melbourne.

The second tribe, Marattieæ, have fronds which are crozier-like in development, sori forming marginal lobes to the segments or placed on under surface of fronds, spore-cases sessile or united in two rows, without a complete ring, opening in two valves.

The type fern of this tribe, Marattia, is not represented in Victoria, but there is one representative genus, Schizæa, of which there are two species—viz., *S. fistulosa*, Comb Fern, and *S bifida*, Forked Comb Fern. These rush-like ferns rarely attain to more than nine inches in height. The forms of their fertile fronds have led to their common names. The former is recorded from various upland districts, but the latter from Brighton district only.

The third tribe, Osmundeæ, have fronds circinate in vernation, entirely or in part fertile, fructification dorsal, spore-cases nearly or quite globular, scarcely any or without ring, opening in two valves.

Two genera of this tribe are found in Victoria—Gleichenia and Todea—both of which are well known. The former has four species—*G. circinata*, Coral Fern, *G. dicarpa*, Wire Fern,

G. flabellata, Umbrella Fern, and *G. Hermanni*, Fan Fern. Although the whole of these beautiful ferns are generally to be found along or in the vicinity of watercourses, some are thriving well in the open fern group on the Oak Lawn in the Botanic Gardens. While they generally attain only a few feet in height, the first-named species is sometimes found in upland gullies and swamps, climbing in tangled masses amongst adjacent vegetation to twenty feet or more. *G. Hermanni* has been recorded only from East Gippsland.

The second genus, Todea, is represented by the well-known species *T. barbara*, King Fern, which is widely distributed throughout the States. This fern, which only grows under natural conditions in the beds of watercourses, does not usually exceed five feet in height. It is, however, sometimes very broad and bulky in its stem-trunk, which, frequently possessing numerous crowns, makes transit through the gullies where it abounds very difficult. In 1886 a very large specimen, weighing approximately 4,000 lbs., was forwarded by the late Baron von Mueller to the Colonial and Indian Exhibition in London.

The fourth tribe, Hymenophylleæ, consists of small, delicate plants with thinly membranous fronds and creeping rhizomes; spore-cases with transverse ring, sessile, or nearly so, on a round, cup-shaped receptacle, deeply two-valved.

This tribe contains only two genera, both of which are represented in Victoria—viz., Trichomanes and Hymenophyllum. There are two species of the former—*T. venosum*, Bristle Fern, and *T. humile*, Short Bristle Fern. These are delicate and beautiful little ferns, with fronds only a few inches long. Frequently, in company with the Hymenophyllum ferns, they clothe the trunks of ferns and other trees and old roots and rocks in the densely-shaded fern gullies throughout Victoria and elsewhere. Directly any lengthened, continuous sunlight is allowed upon these epiphytes they wither and dry. They may be distinguished from the Hymenophyllum ferns by their more entire frondage. The genus Hymenophyllum has three native species—*H. flabellatum*, Shining Filmy Fern, synonymous with *H. nitens*, recorded in the "Key to Victorian Plants," with much divided fronds up to eight inches long; *H. Javanicum*, Austral Filmy Fern, found also in Java, as the name implies; and *H. Tunbridgense*, Tunbridge Filmy Fern, so named from it being first observed at Tunbridge, in Kent. The fronds of this last-named are seldom more than three to four inches long.

The fifth tribe, Cyatheæ, is specially interesting, as it contains three genera, all of which are tree ferns, and having large fronds with sori globular on their under surface, spore-cases small, with more or less oblique ring.

Two of the three genera of this tribe are found in Victoria—viz., Cyathea and Alsophila. The genus Cyathea is represented by two species. *C. medullaris*, Black Tree Fern, is a handsome plant with a trunk attaining to a height of fifty feet and fronds ten to fifteen feet in length. The trunk and bases of stipes are mostly jet black, especially in plants from New Zealand, where also it is found. The pinnæ are of light green colour. Some fine specimens are to be seen in the Botanic Gardens Fern Gully. The second species, *C. Cunninghami*, Slender Tree Fern, is also a beautiful and rather scarce fern. It is sometimes called the "Rat-tailed Tree Fern," owing to its thin and light-brown-coloured trunk. The fronds are not so long as in the preceding species. A few years ago two fine specimens, each about fifteen feet in height, were obtained for the Botanic Gardens by a friend of mine in a very secluded gully in the Boolarra district, South Gippsland. They were carefully wrapped in canvas, and brought by pack-horse to the railway station. One of them subsequently died, but the other is still doing well on the east side of the fern gully in the Gardens.

The genus Alsophila has only one representative—*A. australis*, Prickly Tree Fern—which, while one of the commonest, is one of the most beautiful of our Victorian tree ferns. It is to be found both in the gullies and on the slopes of most of the timbered mountain valleys throughout the State. Its trunk varies from a few inches to fifty feet in height, and, although it succeeds and gives a distinctive setting to landscapes after the timber and scrub under which it originally grew have been destroyed, it is in sheltered valleys, either as single specimens or in masses, that this fern is to be found in its greatest beauty. I shall never forget the great pleasure experienced at my first sight of this and other tree-ferns as I journeyed from Healesville to Fernshaw on the box seat of the coach some thirty years ago, and I have ever since been an ardent admirer and grower of tree-ferns. If one wishes to see these tree-ferns in abundance and natural beauty within an easy distance of Melbourne, I would suggest a trip along the recently-constructed road from Warburton to Mount Donna Buang. The grade of the road is 1 in 15, and can be easily traversed either on foot or by motor or other vehicle. All the way along one passes through beautiful scenery, while fern valley after fern valley of increasing grandeur is crossed, until, at the $5\frac{1}{2}$-mile blaze, Cement Creek is reached. At this spot, which has been selected as the half-way resting-place on the road, giant eucalypts and huge moss-clothed, gnarled native beeches, *Fagus Cunninghami*, surrounded with the usual fern-gully vegetation, are to be seen in all their magnificence. One of

the finest masses of clean and large-fronded examples of this fern that I know of may be seen along the last mile of the Four-Mile Creek, which is quite easy of access from the Warburton railway station. This tree fern, it may be mentioned, is distinctly Australian.

The last and sixth tribe is Polypodieæ, and comprises a large number of ferns of various habits; stems arborescent or creeping, sori on under side or margin of fronds. The tribe is divided into two sections, one having sori with, the other without, indusium, or covering. The spore-cases are small, having a longitudinal or oblique ring.

In the first section we find the genus Dicksonia, with two species—*D. antarctica*, Common or Soft-stemmed Tree Fern, and *D. davallioides*, Creeping Dicksonia. As implied by their common names, these two ferns are of different habits. The former disputes with *Alsophila australis* as to which is our most common tree fern, and is found in numberless quantities, in company with that species, in mountain and forest fern gullies throughout the State. In 1886 I had the selection from Gippsland gullies of a large number of these tree ferns, of varying heights up to thirty feet, which were forwarded to the Colonial and Indian Exhibition in London. One of the trunks had a girth of 12 feet at six feet from the ground. Out of the trunks of this species ornamental vases and pots were formerly shaped and offered for sale in Melbourne. A chair carved out of the trunk of one was for years owned and valued by the late Baron von Mueller. Some of the finest growths of this tree fern are to be seen in the gullies of the Warburton and Healesville districts.

The other species, *D. davallioides*, has a creeping rhizome and deep green-coloured fronds, varying from two to five feet long, with smooth, shining rachis. This fern appears to have only been recorded from Cape Otway district.

The second genus of the tribe Polypodieæ is Davallia, containing two species. *D. pyxidata*, Hare's-foot Fern, is rare, but has been recorded from Gippsland. It is easily recognized by its thick, downy rhizome and falcate fronds, varying from six to twelve inches long, with clear stipes of half their length.

D. dubia, Rainbow Fern, is well known, and is often found growing in exposed positions in the mountainous districts throughout this and the other States. Its fronds are of a light or yellowish-green colour, and largely used by florists as an addition to bunches of cut flowers. It is well suited for outside growth in sheltered positions. A picturesque group of ferns on the Oak Lawn in the Botanic Gardens is largely composed of this fern, which was brought in big clumps from Healesville.

The genus Lindsaya is represented by the two species *L. linearis*, Screw Fern, with creeping rhizome and very narrow fronds up to one foot long, simply pinnate ; and the smaller *L. trichmanioides*, Wiry Fern. Both species are to be found in dark loamy or peaty open and swamp lands.

The well-known genus *Adiantum*, which is represented all over the tropical and temperate regions of the world, is credited with four Victorian species—*A. Æthiopicum*, Common Maidenhair Fern, familiar to us all, but which must not be confused with the well-known English Maidenhair Fern ; *A. capillus Veneris* ; *A. diaphanum*, Filmy Maidenhair Fern ; *A. formosum*, Beautiful Maidenhair Fern ; and *A. hispidulum*, Rough Maidenhair Fern. The last three are all different in frondage to *A. Æthiopicum*, and are of rather rare occurrence in Victoria.

The genus Cheilanthes has one representative which is well known—*C. tenuifolia*, Rock Fern. It is to be found in open spaces in the outlying suburbs of Melbourne, and luxuriates in rocky ground in various districts throughout the State. The two other species which have been generally recognized under Cheilanthes as *C. vellea* and *C. distans* will be mentioned later under the genus Notholæna in their sequence according to the "Flora Australiensis."

One Hypolepis—*H. tenuifolia*, Soft Hypolepis—is recorded for Victoria, but is extremely rare. I have it from Sassafras district. It has light green-coloured fronds, four to five feet in height.

The next genus, Pteris, contains seven species, most of which are well known, all having creeping rhizomes. *P. falcata*, Sickle Fern, is met with in the vicinity of fern-gullies throughout the State. It has dark green fronds, six to eighteen inches high, with sickle-shaped, simple pinnæ one to two or more inches long. It is very hardy.

P. umbrosa, Shady Brake Fern, with erect fronds two to three feet high, of a beautiful shining green colour, and palmate pinnæ, is found in Gippsland.

P. arguta, Tender Bracken, more familiarly known under the name of *P. tremula*, grows to a height of five feet, and is one of the most shapely and beautiful of the genus. It has delicate green frondage. It is extensively grown in pots by our nurserymen for indoor and fernery decoration.

P. longifolia, Long Sickle Fern, has bright green fronds one to two feet in height, with pinnæ three to six inches long. It is found in patches in East Gippsland.

P. aquilina, Common Bracken, is perhaps the most common and widely known of our creeping-rhizomed ferns. Fronds of this species are described as growing to a height of ten feet, but even larger fronds of this rank-growing,

ubiquitous fern have been exhibited at our Club meetings on several occasions.

P. incisa, Batswing Fern, is to be met with in most of our mountain fern gullies, and is easily recognized by its soft greyish-green, slender, compound fronds, with long, bare stipes, frequently three to five or more feet in height.

P. comans, Hairy Bracken, is a beautiful species, to be found in much lesser abundance than the preceding in Gippsland and other fern gullies.

In the next genus, Lomaria, there is a marked difference between the fertile and sterile fronds.

L. Patersoni, Strap Fern, has usually only partly divided and leaf-like fronds. The specific name was given after one of the early Administrators of the Government of New South Wales.

L. discolor, Fishbone Fern, is perhaps the commonest of our Victorian ferns, abounding along almost every upland watercourse. Forms of this species with variously divided pinnæ are occasionally met with, and are much valued by nurserymen and fern lovers.

L. lanceolata, Lance Fern, is one of the most beautiful of the genus, but is only found in the vicinity of watercourses. Its dark green fronds with pinkish midrib make it particularly attractive.

L. alpina, Alpine Lomaria, is the smallest of all the Australian species, with neat fronds from three to six inches in length: recorded from Otway Ranges, the Buffalo Mountains, and other alpine districts.

L. fluviatilis, Delicate Water Fern. The fronds of this species are generally horizontally developed, six to twelve inches in length. Found in the darker gullies in mountain districts, associated with *L. lanceolata*, which it rivals in beauty.

The last species of this genus is *L. capensis*, Soft Water Fern, with its variety *L. procera* (Rough Water Fern). The fronds of this species are frequently of a light green colour, and have narrower pinnæ, while the variety has darker and leather-like fronds. The young fronds, in their early development, often assume a beautiful reddish colour, due, probably, in a large measure to the soils in which it is then found.

The genus Lomaria, in the recent classification, is included under Blechnum, which has hitherto had only one representative amongst Victorian ferns, viz.:—

Blechnum cartilagineum, Gristle Fern. This fern is found distributed throughout the State in the vicinity of fern-gullies in mountain districts. Like the previously-

mentioned Lomaria, the young fronds often assume a red or pinkish hue in some exposed positions. It is somewhat similar at certain stages to *Lomaria discolor*, but the pinnæ are eventually much broader, different in colour, and longer. The distinctive band of sori which is borne along the midrib of the pinnæ makes this fern, when in fruit, easily recognizable.

The next genus, Doodia, known also as Woodwardia, contains two species, *D. aspera*, Rasp Fern, and *D. caudata*, Small Rasp Fern—the former with fronds up to twelve inches and the latter six to nine inches in height. *D. aspera* is to be found on rocky ground on the banks of creeks and watercourses in various parts of the State, from Lorne (where it may be seen in great colour beauty) to East Gippsland. *D. caudata* is found in the vicinity of fern gullies in the Dandenong and other ranges.

The genus Asplenium, which follows, has nine Victorian species. In this genus the sori are arranged in lines on the under side of the frond, on veins proceeding from the midrib.

A. nidus, Bird's-nest Fern, is well known by its undivided fronds, two to six feet in length, and the form assumed by the plant. In Victoria the species has been recorded only from East Gippsland.

A. trichomanes, Common Spleenwort—a small, neat, black-stemmed fern. Fronds up to six inches in length, with rounded pinnæ. It is found in alpine regions.

A. flabellifolium, Rat-tail Spleenwort, is a well-known delicate little fern, generally found growing in the crevices of rocks and other places in the vicinity of trickling streams or other watercourses in all the States. Fronds usually up to twelve inches in length, although Mr. J. Stickland exhibited some much longer ones at one of our meetings last year.

A. Hookerianum, Hooker Spleenwort, recorded from Beech Forest and East Gippsland; a rather rare species, with slender fronds six inches in length.

A. furcatum (syn. *A. præmorsum*), Forked Spleenwort. A still rarer species than the preceding, from the Grampians district, with dark green coriaceous fronds from six to eighteen inches long, with segments of pinnæ deeply and irregularly serrated.

A. obtusatum, Sea Spleenwort. This species was recorded by the late Baron von Mueller as *A. marinum*. It is stated to be usually found near the coast, and has been recorded from East Gippsland.

A. bulbiferum, Mother Spleenwort, has dark green fronds one to two feet long, and is found in the denser fern-gullies in many of our mountain districts, often growing on and at

the base of tree ferns and fallen tree-trunks. Young plants are frequently developed in the form of bulbils on or near the apex of the rachis of the frond, as in the case of *Aspidium aculeatum* and one or two other species.

A. umbrosum, Shady Spleenwort, has large, umbrageous fronds three to five feet in length, of a bright green colour. It is a handsome fern, but luxuriates only in the darker gullies of our mountain districts, where it often forms a trunk from twelve to eighteen inches in height.

A. flaccidum, Limp Spleenwort, is another beautiful species found growing on the stems of tree-ferns Its fronds, which frequently have a pendent habit, are from twelve to eighteen inches long, and have rather narrow, segmented pinnæ. The sori on the under surface extend to the margin of the frond, and give a very fine appearance to the fern when fruiting.

The genus Cystopteris, with its single Australian species, *C. fragilis*, Brittle Bladder Fern. formerly only recorded from Tasmania, has since been noted from Victoria. It has a creeping, scaly rhizome, with fronds usually six to nine inches long, and is found in damp places.

The last family of this group of Polypodieæ is Aspidium, with six species in our State. Under the recent re-classification three of these will be brought under the genus Dryopteris and three under Polystichum, neither of which families have other Victorian representatives. The Aspidiums are characterized by having their orbicular sori variously dispersed over the under surface of the frond. The following are the species under the former classification, with which we are more familiar, viz. :—

A. molle, Soft Shield Fern, with fronds of a delicate downy character, one to fwo feet long. It is recorded from the north-west part of the State.

A. aculeatum, Cat-head Fern, is a well-known species. Its dark fronds, one to three feet long, have their thick rachis and the pinnæ covered with dark brown scales mixed with hairy ones, presenting a very shaggy appearance. This fern, like *Asplenium bulbiferum*, has a habit of forming, at the apex of the rachis and at other parts of the fronds, young bulbils, which, on being carefully removed and planted, readily make new plants.

A. coriaceum, Leathery Shield Fern, a species more commonly known as *A. capense*, is a distinct fern with thick, leather-like fronds up to twelve inches long. It has a creeping rhizome, and is found largely on the trunks of ferns and other vegetation in mountain gullies throughout the State.

A. decompositum, Shiny Shield Fern, is somewhat similar to the preceding species. It assumes the form of tufts, by

the number of fronds developed in a single plant. It is found in most fern gullies throughout the State, occasionally on the trunks and at the base of tree ferns.

A. tenerum, Tender Shield Fern. This species is stated to closely resemble the last-mentioned species, but has the pinnules more regularly lobed or dentate, and sori nearer the margin. I am not sure of the locality in which this is found, although specimens in the National Herbarium I was privileged to examine are labelled from Mount Dromedary.

A. hispidum, Hairy Shield Fern, is another very beautiful species, with clear bases or stipes half as long as fronds, and covered with hairs. Fronds one to two feet long. I have some fine specimens from Beech Forest of this fern, which is found also in the Healesville and Gippsland districts.

The genus Polypodium belongs to the second group of Polypodieæ, having sori without indusium (covering) It is a well-known family, and comprises six species.

Polypodium australe, Finger Fern, is one of the smaller kinds, with simple or undivided fronds a few inches only in length and of a greyish-green colour. It is found principally on the trunks of tree ferns in most of the fern gullies throughout the State.

Polypodium grammitidis, Gipsy Fern, is small, and similar in habit of growth to the preceding ; but the fronds are deeply divided or forked. It is found in the Otway as well as in the Dandenong, Healesville, and Gippsland ranges, growing on tree ferns and other vegetation.

P. serpens, Creeping Polypody. Another small but rarer species, with fronds of a glaucous green colour, thick in texture, and generally not more than two inches in length. Found growing on the branches of stems and on rocks in fern-gullies in East Gippsland.

P. pustulatum, Spotted Polypody, is one of the most familiar of our climbing ferns, found growing principally along the trunks and at the summit of tree ferns in nearly all mountain gullies. It is found, too, on other vegetation there, as well as (at times) in exposed positions on rocky boulders. The fronds are developed along the creeping rhizome, and are up to eighteen inches long. A beautifully crested form of this species is to be seen in the fernery at the Geelong Botanic Gardens.

P. scandens, Scented Polypody, is a species of similar habit, and difficult of distinction from the preceding species. The recorded difference is that the fronds of this species are membranous, while the preceding are of firm texture, and that, while in the former species the segments of the

divided fronds are three to six inches long, in this species they are rarely more than three inches.

The last species, *P. punctatum*, Ground Polypody, has a distinctive habit, as its common name implies. It has, also, very much divided fronds one to four feet in length, which rise from its creeping rhizome under the surface of the ground. It has a downy and greyish-green appearance. It is found in and adjacent to fern gullies, while a smooth variety is found in exposed positions along mountain tram and other tracks in upland districts.

The genus Notholæna has two species, *N. Brownii* or *vellea*, Downy Rock Fern, and *N. distans*, Bristly Rock Fern. Both of these are included in the "Key to Victorian Plants" under Cheilanthes. They are both small ferns, similar in habit, with fronds up to six inches in length. The former has its pinnæ covered underneath with woolly, and the latter with bristly, scales. The former is recorded from North-West Victoria: the latter is found in the Dividing and Otway Ranges.

The only remaining family of this group of Polypodieæ, and the last genus to be included in this summary of Victorian ferns, is that of Grammitis, which possesses two species in our State. These are *G. rutæfolia*, Common Rue Fern, and *G. leptophylla*, Delicate Rue Fern. Both of these are small plants with tufted, fan-shaped, greyish-green or brown coloured fronds up to six inches long. In the former species they are covered with brown scaly hairs. The plants, although rather rare now, were frequently to be found growing in the crevices of basaltic and other rocks on the banks of creeks around Melbourne. It is now to be found in similar situations farther out, extending to the Grampians and to the Otway and Gippsland ranges. The latter species is more delicate, and at times very minute, and is, moreover, very distinct, by being an annual plant. It is recorded from numerous localities in various parts of the State, but is more largely found in upland districts.

We have now hastily glanced through the complete series of Victorian ferns, although we have only been able to refer in a general way to each species. Their respective geographical distributions, with other particulars, are given in the alphabetical list which is appended to this paper.

Propagation and Cultivation of Ferns.

As with the generality of ferns, so many of our native ferns may be propagated in various ways according to their different habits and modes of growth.

Although I do not know of any extensive propagation of our Victorian species by spores, either by florists or nurserymen or

private individuals, owing probably to the facilities for obtaining the principal species in seedling form from our natural fern-grounds, yet there would be no difficulty in raising stock of most of our tree and other ferns from spores, as is done with them elsewhere.

The general method adopted could be followed with undoubted success. When the spores are ripe—which is indicated by the sori becoming brown—pieces of fronds containing these should be cut off carefully and placed in small paper bags for drying. After being kept for a few days they may be sown in flower pots or pans specially prepared for their reception by being filled with well-sifted loam and peaty soil in equal quantities, mixed with finely-powdered or crushed brick material. These pots or pans should be well drained by being nearly half-filled in the first instance with crocks (broken pieces of brick or pots). The soil, after being filled in to within half an inch of the top of the pot, should be pressed firmly down with the bottom of another pot and then well watered and allowed to drain. After this the spores may be scattered very finely over the surface. A piece of glass should then be placed horizontally over the pot, which will induce a moisture and encourage germination. The glass should be occasionally removed and wiped. The pots or pans must be kept in a frame or conservatory, and sheltered from too much light.

After germination, which will vary in the different species, but may be averaged at, say, six weeks, little patches of the seedlings may be transferred and "pricked" into similarly prepared pots, and subsequently again divided after growth until they are able to be established as individual plants.

Another method of propagation of many ferns is by division of the crowns of growing plants. As a number of our Lomarias, Todeas, and other ferns produce many crowns, these may be carefully divided if with each crown it is possible to cut a portion of the stem and root without injury to the plant. In other cases complete individual plants arise from the creeping rhizomes, which, being only connected by root with the parent plant, may be easily removed. This is the method by which so many thousands of greenhouse and cultivated ferns, including the beautiful class of ornamental Nephrolepis—now so popular for ordinary and indoor cultivation—are propagated by plant-growers and nurserymen. This method may be adopted and facilitated with many of our local ferns, such as Davallia, Gleichenia, Polypodium, by layering the growing points of their rhizomes and subsequently removing carefully the portions that have formed fresh roots. A few of our ferns, notably *Aspidium aculeatum* and *Asplenium bulbiferum*, produce bulbils at the apex or along the rachis of the fronds.

These, if carefully removed and immediately placed in pots suitably prepared, may frequently be grown into fine healthy plants.

In securing ferns from our natural gullies and elsewhere for the purpose of transplanting in our gardens or for pots for our homes, generally speaking they should be taken from places where they can be readily removed with small balls of earth or fibrous material, so as not to interfere with their own immediate root system. Unless the plants are very young and healthy, the fronds should all be cut half back, so as to induce a more rapid new growth after planting. It is the ruthless and indiscriminate pulling and dragging out of the ground and gullies of large plants and bundles of ferns, and their removal without any soil, that is attended with either little or no success, and proves so destructive of the fern glades and gullies nearest to Melbourne.

It is interesting to know that so large a number of our native ferns may be transferred to our private gardens and will grow successfully both out of doors as well as in ferneries, verandahs, and sheltered porches. To all lovers of plants it may be pointed out that there are very few private gardens where a suitable spot could not be found in which several species might readily be grown and make an additionally attractive feature of the garden. There are, however, a few essentials for their successful culture, viz. :—Shelter from regular, direct wind, an easterly or southern aspect, building or other vegetation shade from too long continued sunlight ; keeping very old fronds cut, and the soil clean and loose ; plenty of water. If these conditions are met, any or all of the following varied selection of twelve species may be grown in the open garden :— *Alsophila australis*, *Dicksonia antarctica*, *Aspidium aculeatum*, *Lomaria discolor*, *Blechnum cartilagineum*, *Davallia dubia*, *Pteris falcata*, *Lomaria capensis*, var. *procera*, *Aspidium decompositum*, *Polypodium punctatum*, *Todea barbara*, and *Gleichenia circinata*. The foregoing have been named in their relative order of value for easy culture, in case it is not desired to grow all of them. To those who desire to grow our native ferns in pots, cool conservatories, ferneries, verandahs, or sheltered porches, it will be encouraging for them to know that, on comparing lists of the different species grown by several of our members, including Dr. C. S. Sutton, Mr. F. G. A. Barnard, Mr. J. Stickland, and others, it is found that no less than fifty of the seventy-three Victorian species enumerated in the appendix to this paper are in cultivation. With the exception of Trichomanes and Hymenophyllum, which require to be grown in a well-shaded frame under a bell glass or in some other dark, shaded position where an atmosphere of continuous moisture can be

provided, the whole of the native ferns can, with a little care and attention, be successfully grown. Nearly all ferns require plenty of water in dry or summer weather; consequently, in pot culture good drainage should be provided in order to prevent the soil becoming sour or water-logged. Although the soil for some kinds, such as Botrychium, Cheilanthes, and Grammitis may require to be of a somewhat different character, yet it will be found that a soil composed of leaf or other vegetable mould, loam, and peat, with crushed charcoal mixed throughout, will suit nearly all the species. In the case of the epiphytal species of Polypodium, it will, of course, be advisable to grow them on pieces of trunks of tree-ferns, or some other equally suitable substitute. They should be grown in shaded spots against a wall and away from the wind, and will require plenty of water. Broad pans should be used for the species of Davallia and Gleichenia and some species of Pteris, in order to allow their creeping rhizomes facilities for healthy growth.

The Drying of Fern Specimens.

When drying ferns for herbarium specimens, only fairly well developed fronds should be taken, as young ones shrivel up in the process. In the case of epiphytal ferns and others with creeping rhizomes, portions of the creeping stem with the frond or fronds should be taken. Where fruiting fronds are to be found on the plant, it is advisable to dry one or more of them, as well as the plain or sterile fronds.

The specimens may be placed separately between sheets of blotting paper, or even ordinary newspaper, and should be carefully spread out flat between a thickness of three to six sheets of paper, according to the character of the specimens. From twelve to twenty specimens, in such condition, may then be placed between two thick boards, and be either subjected to heavy weights or strapped tightly together for a couple of days. The specimens should then be transferred to fresh drying paper and placed in a similar condition for another period of three or four days, and after two or three more of such changes the specimens will be ready for placing in their permanent positions in herbarium paper or in albums, for future reference. The locality and date of the collecting of the specimens, with any other desired particulars, should be recorded on the label to be kept with the specimens.

In conclusion, it may be pointed out to those desiring to acquaint themselves with our native ferns that there is no better method to be suggested than that of making a collection of herbarium specimens of the fronds of such species as they may meet with from time to time. Ferns, of all plants, lend themselves most readily for drying for herbarium purposes.

APPENDIX.

ALPHABETICAL LIST OF VICTORIAN FERNS SHOWING THEIR GEOGRAPHICAL DISTRIBUTION.

The asterisk (*) indicates habitat.

	N.S.W.	Q'land.	S. Aust.	W. Aust.	N. Aust.	Tas.	N.Z.	Europe.	Asia.	Africa.	America	Polynsa.
ADIANTUM, Lin. (*adiantos*, dry, the fronds being impervious to water)—												
Æthiopicum, Lin. .. .. Common Maidenhair	*	*	*	*	—	*	*	*	*	*	*	*
diaphanum, Blume.. .. .. Filmy Maidenhair	*	*	—	—	—	—	*	—	*	—	—	*
formosum, R. Br. .. .. Beautiful Maidenhair	*	*	—	—	—	—	*	—	—	—	—	—
hispidulum, Swartz .. .. Rough Maidenhair	*	*	—	—	—	—	*	—	*	*	*	*
ALSOPHILA, R. Br. (*alsos*, grove, and *phileo*, to love)—												
australis, R. Br. .. .. Prickly Tree Fern	*	*	—	—	—	*	—	—	—	—	—	—
ASPIDIUM, Swartz (*aspidion*, a little buckler, the form of the indusium)—												
aculeatum, Swartz .. .. Cat-head Fern	*	*	*	—	—	*	*	*	*	*	*	*
coriaceum, Swartz .. .. Leathery Shield Fern	*	—	—	—	—	*	*	—	*	*	*	—
decompositum, Spreng. .. Shiny Shield Fern	*	*	*	—	—	*	*	—	—	—	—	*
hispidum, Swartz .. .. Hairy Shield Fern	*	—	—	—	—	*	*	—	—	—	—	—
molle, Swartz .. .. .. Soft Shield Fern	*	*	*	—	*	—	*	—	*	*	—	*
tenerum, Spreng. .. .. Tender Shield Fern	*	*	—	—	—	—	—	—	—	—	—	—
ASPLENIUM, Lin. (*a*, not, and *splen*, spleen, in allusion to some supposed medicinal qualities)—												
bulbiferum, G. Forst. .. .. Mother Spleenwort	*	*	*	—	—	*	*	—	*	*	*	*
flabellifolium, Cav. .. .. Rat-tail Spleenwort	*	*	*	*	—	*	*	—	—	—	—	—
flaccidum, Forst. .. .. Limp Spleenwort	*	*	—	—	—	*	*	—	—	*	—	*
Hookerianum, Colenso .. Hooker Spleenwort	*	—	—	—	—	—	*	—	—	—	—	—
nidus, Lin. .. .. .. Bird's-nest Fern	*	*	—	—	—	—	—	—	*	*	—	*
obtusatum, Forst. (A. marinum, Lin.), Sea Spleenwort	*	*	—	—	—	*	*	*	*	*	*	*
præmorsum, Swartz (A. furcatum, Thunb.), Forked Spleenwort	*	—	*	*	—	—	—	—	*	*	*	*
Trichomanes, Lin. .. .. Common Spleenwort	*	—	—	—	—	*	*	*	*	*	*	*
umbrosum, J. Smith .. .. Shady Spleenwort	*	*	—	—	—	*	*	—	*	*	—	—

	N.S.W.	Q'land.	S. Aust.	W. Aust.	N. Aust.	Tas.	N.Z.	Europe.	Asia.	Africa.	America	Polynsa.
BLECHNUM (*Blechnon*, the Greek name of a fern)—												
cartilagineum, Swartz .. Gristle Fern	*	*	—	—	—	—	—	—	—	—	—	—
BOTRYCHIUM (*Botrys*, a bunch, form assumed by fertile fronds)—												
Lunaria, Swartz .. .. Common Moonwort	*	—	—	—	—	*	—	*	*	—	*	—
ternatum, Swartz .. .. Meadow Moonwort	*	*	*	—	—	*	*	—	*	—	—	—
CHEILANTHES (*cheilos*, a lip, and *anthos*, a flower, in allusion to the form of the indusium)—												
tenuifolia, Swartz .. .. Common Rock Fern	*	*	*	*	*	*	*	—	*	—	—	*
CYATHEA (*kyatheion*, a little cup, referring to the appearance of the spores)—												
Cunninghami, J. Hooker .. Slender Tree Fern	—	—	—	—	—	*	*	—	—	—	—	—
medullaris, Swartz .. .. Black Tree Fern	*	—	—	—	—	*	*	—	*	—	—	*
CYSTOPTERIS (*kystis*, a bladder, and *pteris*, a fern)—												
fragilis, Bernh. .. .. .. Brittle Bladder Fern	—	—	—	—	—	*	*	*	*	*	*	*
DAVALLIA (named after E. Davall, a Swiss botanist)—												
dubia, R. Br. .. .. .. Rainbow Fern	*	*	—	—	—	*	—	—	—	—	—	—
pyxidata, Cav. .. .. .. Hare's-foot Fern	*	*	—	—	—	—	—	—	—	—	—	*
DICKSONIA (named after Jas. Dickson, a famous British cryptogamic botanist)—												
antarctica, Labill. .. .. Common Tree Fern	*	*	*	—	—	*	*	—	—	—	—	*
davallioides, R. Br. .. .. Creeping Dicksonia	*	*	—	—	—	—	*	—	*	—	—	*
DOODIA (named after S. Doody, a London apothecary and botanist)—												
aspera, R. Br. .. .. .. Rasp Fern	*	*	—	—	—	—	—	—	—	—	—	—
caudata, Cav. .. .. .. Small Rasp Fern	*	*	—	—	*	*	*	—	—	—	—	*
GLEICHENIA (named in honour of W. F. Gleichen, a German botanist)—												
circinata, Swartz .. .. Coral Fern	*	*	*	—	*	*	*	—	*	—	—	*
dicarpa, R. Br. .. .. .. Wire Fern	*	*	—	—	—	*	*	—	*	—	—	*

	N.S.W.	Q'land.	S. Aust.	W. Aust.	N. Aust.	Tas.	N.Z.	Europe.	Asia.	Africa.	America	Polynsa.
GLEICHENIA—*continued.*												
flabellata, R. Br. .. .. Umbrella Fern	*	*	—	—	*	*	*	—	—	—	—	*
Hermanni, R. Br. .. .. Fan Fern	*	*	—	—	*	—	*	—	*	*	*	*
GRAMMITIS (from *gramma*, a line, the sori being linear)—												
leptophylla, Swartz .. .. Delicate Rue Fern	*	—	*	*	—	*	*	*	*	*	*	*
rutæfolia, R. Br. .. .. Common Rue Fern	*	*	*	*	—	*	*	*	—	—	*	—
HYMENOPHYLLUM (*hymen*, a membrane, and *phyllon*, a leaf; delicate texture of fronds)—												
flabellatum, Labill. .. .. Shining Filmy Fern	*	*	—	—	—	*	*	—	—	—	—	*
Javanicum, Spreng. .. .. Austral Filmy Fern	*	*	—	—	—	*	*	—	*	—	—	*
Tunbridgense, Smith .. .. Tunbridge Filmy Fern	*	*	—	—	—	*	*	*	*	*	*	*
HYPOLEPIS (*hypo*, under, and *lepis*, a scale; referring to position of sorus)—												
tenuifolia, Bernh. .. .. Soft Hypolepis	*	*	—	—	—	—	*	—	*	—	—	*
LINDSAYA (named after A. Lindsay, an English botanist)—												
linearis, Swartz .. .. .. Screw Fern	*	*	*	*	—	*	*	—	—	—	—	*
trichomanioides, Dry .. .. Wiry Fern	*	—	—	—	—	*	*	—	—	—	—	—
LOMARIA (*loma*, an edge, in allusion to position of sori on fronds)—												
alpina, Spreng. .. .. .. Alpine Lomaria	*	—	—	—	—	*	*	—	—	—	*	—
capensis, Willd. .. .. Soft Water Fern	*	*	*	—	—	*	*	—	*	*	*	*
capensis, var. procera, Spreng. Rough Water Fern	*	*	*	—	—	*	*	—	*	*	*	*
discolor, Willd. .. .. .. Fish-bone Fern	*	*	*	—	—	*	*	—	—	—	—	—
fluviatilis, Spreng. .. .. Delicate Water Fern	*	—	—	—	—	*	*	—	—	—	—	—
lanceolata, Spreng. .. .. Lance Fern	*	—	*	—	—	*	*	—	—	—	—	*
Patersoni, Spreng. .. .. Strap Fern	*	*	—	—	—	*	*	—	*	—	—	*
NOTHOLÆNA (*nothos*, spurious, and *chlaina*, a cloak; alluding to the edge of the fronds curving over the sori)—												
Brownii, Desv. (N. vellea, R. Br.), Downy Rock Fern	*	*	*	*	*	—	—	*	*	*	—	—
distans, R. Br. .. .. .. Bristly Rock Fern	*	*	*	*	—	—	*	—	—	—	—	*

	N.S.W.	Q'land.	S. Aust.	W. Aust.	N. Aust.	Tas.	N.Z.	Europe.	Asia.	Africa.	America.	Polynsa.
OPHIOGLOSSUM (*ophios*, a snake, and *glossa*, a tongue; in reference to the form of the fertile frond)—												
vulgatum, L. .. .. Adder's Tongue	*	*	*	—	*	*	*	*	*	*	*	*
POLYPODIUM (*polys*, many, and *podion*, a foot; referring to the creeping rhizomes)—												
australe, Metten .. .. Finger Fern	*	*	—	—	—	*	*	—	—	—	*	—
grammitidis, R. Br. .. .. Gipsy Fern	*	—	—	—	—	*	*	—	—	—	—	—
punctatum, Thunb. .. .. Ground Polypody	*	*	*	—	—	*	*	—	*	*	—	—
pustulatum, G. Forst. .. .. Spotted Polypody	*	*	—	—	—	*	*	—	—	—	—	*
scandens, G. Forst. .. .. Scented Polypody	*	*	—	—	—	—	*	—	—	—	—	*
serpens, G. Forst. .. .. Creeping Polypody	*	*	—	—	—	—	*	—	—	—	—	*
PTERIS (*pteron*, a feather, in allusion to the graceful fronds of some species)—												
aquilina, L. .. .. Common Bracken	*	*	*	*	—	*	*	*	*	*	*	*
arguta, Aiton (P. tremula, R. Br.), Tender Bracken	*	*	*	—	—	*	*	*	*	*	*	*
comans, G. Forst. .. .. Hairy Bracken	*	*	—	—	—	*	*	*	—	—	—	—
falcata, R. Br. .. .. Sickle Fern	*	*	—	—	—	*	*	*	*	*	*	*
incisa, Thunb. .. .. Batswing Fern	*	*	*	—	—	*	*	*	*	*	*	*
longifolia, Lin. .. .. Long Sickle Fern	*	*	—	—	—	—	—	*	—	—	—	—
umbrosa, R. Br. .. .. Shady Brake Fern	*	*	—	—	—	—	—	—	—	—	—	—
SCHIZÆA (*schizo*, to split, the fronds being divided)—												
bifida, Willd. .. .. Forked Comb Fern	*	*	*	—	*	*	*	—	—	—	*	*
fistulosa, Labill. .. .. Comb Fern	*	—	*	—	—	*	*	—	—	*	*	—
TODEA (named in honour of Henry Julius Tode, of Mechlenburg)—												
barbara, T. Moore .. .. King Fern	*	*	*	—	—	*	*	—	—	*	—	—
TRICHOMANES (*thrix*, *trichos*, a hair, and *manos*, soft; alluding to the delicate nature of fronds)—												
humile, G. Forst. .. .. Short Bristle Fern	*	—	—	—	—	—	*	—	*	—	—	*
venosum, R. Br. .. .. Bristle Fern	*	*	—	—	—	*	*	—	—	—	—	—

The Victorian Naturalist.

Vol. XXX.—No. 2. JUNE 12, 1913. No. 354.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 12th May, 1913.

The president, Dr. J. A. Leach, occupied the chair, and about 85 members and visitors were present.

CORRESPONDENCE.

From Mr. O. Rosenhain, stating that, in connection with the forthcoming Chamber of Manufacturers' Exhibition, a provisional committee had been formed to work up a scheme to make a display in the interests of bird protection, and requesting that three delegates be appointed to represent the Club on the committee.

On the motion of Mr. F. G. A. Barnard and Dr. E. B. Nicholls, it was resolved that Messrs. G. A. Keartland, J. Gabriel, and C. Brittlebank represent the Club.

Prof. A. J. Ewart, Ph.D., forwarded a letter which he had received from Mr. O. H. Sargent, of York, W.A., intimating that he desired to obtain some dormant tubers or dried specimens of the orchid *Drakæa irritabilis*, also any information relating to the habits of this species.

REPORTS.

An illustrated report of the excursion to Phillip Island, held during Easter (20th to 25th March), was given by the leaders, Mr. J. Gabriel and Dr. E. B. Nicholls, who said that there was an attendance of twenty-three, including several members of the Bird Observers' Club. Some time was given to dredging off Rhyll, and resulted in a fair number of polyzoa being obtained. Demonstrations on the mounting of seaweed, &c., were given, and valuable observations on the Mutton-birds and Penguins were made whilst on trips to the Nobbies and Cape Woolamai.

With the help of a short series of lantern views, Mr. F. Chapman, the leader of the excursion to the Mont Albert district on Saturday, 26th April, explained the object of the outing—viz., the visit to a quarry in a volcanic plug in the midst of a large Silurian area at North Balwyn. He reported a good attendance of members, and a very enjoyable afternoon.

A report of the excursion to Maribyrnong Bridge on Saturday, 10th May, was, in the absence of the acting leader, Mr. A.

James, given by Mr. F. G. A. Barnard, who said that, considering the doubtful weather, there had been a fair attendance of members. A visit was first made to the bank of the stream, where the Older Volcanic formation was pointed out, just above the level of the water; then Quarry Hill was ascended, and the Newer Volcanic seen, with the Tertiary sands intervening. Some fine examples of spheroidal weathering were seen in the old quarry. The river was then crossed, and the quarries in the Newer Basalt near "Raleigh's Lookout" inspected. These are also underlain by a considerable thickness of Tertiary sands. On the edge of the stream the lignum, *Muehlenbeckia Cunninghami*, was noticed in flower, and some fair-sized trees of *Myoporum insulare* were also noted.

A report of the junior excursion to Cheltenham and Beaumaris on Saturday, 3rd May, was given by the leader, Mr. A. L. Scott, who reported a poor attendance of juniors The party walked from Cheltenham to the cliffs at Beaumaris. On the way a brief explanation was given of the nature and origin of fossils, and attention drawn to some features of interest along the coast. A general search was kept up for objects of interest, resulting in the finding of lamp shells, sharks' teeth, whalebone, &c.

ELECTION OF MEMBERS.

On a ballot being taken, Misses E. A. Robertson, 217 Royal-parade, Parkville; A. Robertson, Upper Plenty-road, Ivanhoe; and L. Shaw, White-street, Moreland, were duly elected ordinary members; Mr. L. Heriot, Notting Hill, a country member; Miss E. J. Robertson, 35 Hutcheson-street, Moonee Ponds, an associate; and Masters C. Anstey, W. Tewkesbury, B. Oldham, Grange School, South Yarra: Miss J. Berry, Victoria-avenue, Canterbury, and Miss K. Derham, 243 Auburn-road, Hawthorn, as junior members of the Club.

GENERAL BUSINESS.

The president welcomed to the meeting Mr. A. E. Kitson, F.G.S., who had returned for a short time, after having spent some years on geological survey work in Southern Nigeria, British West Africa.

Mr. Kitson, in thanking members for their warm welcome, said that it was a great pleasure indeed to be back again amongst his scientific friends in Australia. He had spent the greater part of his time in the Australian bush, and had learned to appreciate the country as only those who are nature-lovers can. In British Nigeria is being built up a colony which is going to have a great deal to say in matters of the world generally, and is going to surprise the nations in many ways. By way of answer to a suggestion of the chairman, he might say that he had a large series of lantern slides

illustrating the country, which he would have pleasure in placing before the members, if a convenient time could be fixed.

Mr. A. D. Hardy, F.L.S., moved that Mr. Kitson be invited to lecture on Southern Nigeria, and that a special meeting be held at a date to be fixed by the committee.

The motion was seconded by Mr. F. G. A. Barnard, and carried unanimously.

Dr. T. S. Hall, M.A., stated that the Royal Society proposed erecting a new hall to seat about 300 people, and, in order to raise funds, Prof. W. B. Spencer had consented to give a lecture on the Northern Territory in the Auditorium on 6th June.

Mr. F. G. A. Barnard pointed out that the June meeting of the Club would fall on King's Birthday, and suggested that it be postponed until 16th June, and moved accordingly.

This was seconded by Dr. C. S. Sutton, and carried.

PAPERS.

Owing to the lateness of the hour, the reading of a paper by Mr. A. D. Hardy, F.L.S., entitled "The Algæ of the Flamingo Pool, Zoological Gardens, Melbourne," was postponed.

NATURAL HISTORY NOTES.

Dr. J. A. Leach referred to the reduced numbers of occupants in Mutton-bird burrows at Phillip Island, not more than 10 per cent. yielding birds. He proposed that camps should be held during the summer months and at Easter for some years to come in order that data relative to the habits of these birds might be collected.

Dr. E. B. Nicholls stated that on a previous visit to the locality burrows were marked with numbered stakes, but many of these could not be found on the occasion of the visit of the Club's excursion party at Easter.

Mr. A. D. Hardy, F.L.S., asked if any attempt had been made to put secret marks in addition to the stakes. This system had been adopted with success in survey work.

Mr. Chandler thought the idea a good one, and suggested its adoption.

Mr. A. E. Kitson, F.G.S., mentioned that, whilst on the voyage out from England, when the ship was off the coast of Spain, a Painted Quail was caught on deck one night at 11.30. It refused food and water for two days. After reaching Marseilles it was set free, when it flew into a strong breeze, and, rising steadily, proceeded inland. Later on, when off the Cocos Islands, a Sooty Petrel came aboard, but vanished in the darkness as soon as liberated.

EXHIBITS.

By Mr. J. W. Audas, F.L.S.—*Epacris microphylla*, R. Br., variegated form, collected near Vereker Range, Wilson's Promontory, December, 1912.

By Mr. F. G. A. Barnard.—Older and Newer Basalt, also Tertiary sand, from Maribyrnong excursion.

By Mr. F. Chapman, A.L.S.—Slide and specimen of volcanic rock, Monchiquite, from Whitethorn-road, Balwyn; flowering branch of *Hakea laurina*, usually listed as *H. eucalyptoides*, grown at Balwyn.

By Mr. F. Cudmore.—A large coral, Stenopora, sp., from the Palæozoic of Southern Tasmania.

By Mr. J. Gabriel.—Native axe found at Rhyll; Polyzoa from Western Port Bay; mud-inhabiting molluscs, including *Modiola arborescens*, Chem., *M. victoriæ*, Pritch. and Gatliff, *Theora fragilis*, A. Ad., and *Myodora brevis*, Sow.

By Master K. Glance.—Flower of yucca.

By Mr. A. L. Scott.—Basalt and Tachylite slides in illustration of report of Maribyrnong Bridge excursion.

By Mr. J. Searle.—Freshwater crustacean, *Anaspides tasmaniæ*, Thom., from Mount Wellington, Tasmania; Fairy Shrimps, *Branchinella australiensis*, Sayce, recently collected near Werribee, and *Parartemia zeitziana*, Sayce, from the Salt-pans, near Geelong.

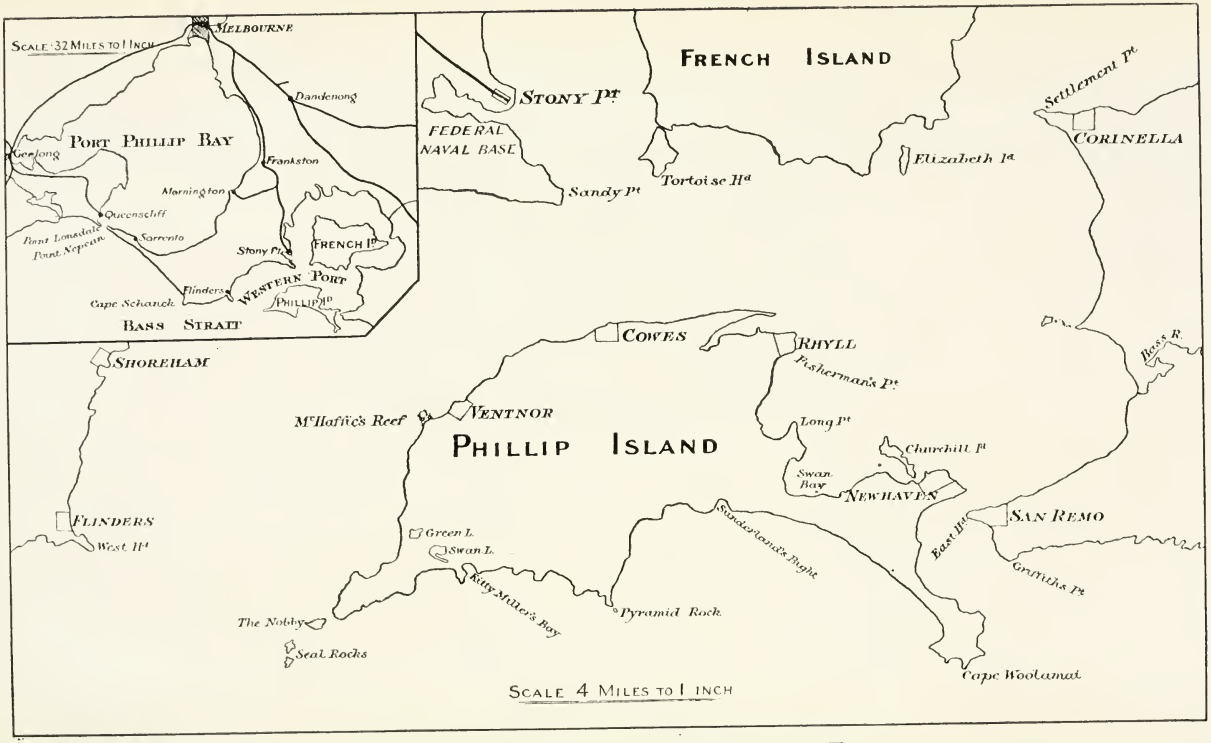
By Dr. C. S. Sutton and Mr. P. R. H. St. John.—Specimen of seedling (seldom found) of *Exocarpus cupressiformis*, Labill.; specimen of *Acacia verticillata*, showing true leaves and phyllodes, collected at Frankston, 3rd May, 1913.

By Mr. P. R. H. St. John.—Specimen in bloom of *Avicennia officinalis*, Linn., False Mangrove, collected at Kororoit Creek, Williamstown, 10th May, 1913.

By Mr. J. R. Tovey.—Dried specimens of *Myagrum perfoliatum*, L., Musk Weed, collected in the Wimmera district by exhibitor, 2nd February, 1913, a native of Europe and the Orient, recently recorded as a naturalized alien in this State—a troublesome weed in cornfields; *Rapistrum rugosum*, All., Giant Mustard or Turnip-weed, collected in the Bacchus Marsh district by exhibitor and C. French, jun., November, 1910, a native of Europe and the Orient, a troublesome weed in cornfields, now naturalized in Victoria; and *Artemisia vulgaris*, L., Mugwort, collected at Coode Island, Victoria, March, 1913, by exhibitor and C. French, jun., a native of the north temperate regions, not yet sufficiently established to be considered naturalized.

After the usual conversazione the meeting terminated.

Freshwater Mollusca.—Mr. F. L. Billinghurst, Bacchus Marsh, is anxious to obtain live specimens of freshwater mollusca. Members forwarding such to him will be good enough to give precise locality.



N. F. W. Barnard, del.

PHILLIP ISLAND AND WESTERN PORT.

PLATE I.

EXCURSION TO PHILLIP ISLAND.

Phillip Island is situated at the mouth of Western Port Bay, and, on account of its genial climate, has been described by many as the "Isle of Wight" of Victoria. Although so conveniently situated, within a few hours' journey from Melbourne, it is astonishing that so few people avail themselves of its many advantages. For the naturalist it is an ideal spot, there being an abundance of material to work upon. The Short-tailed Petrel, *Puffinus brevicaudus*, Gld., more familiarly known as the Mutton-bird, alone is an extremely attractive study, and the observation of the avifauna generally amply repays a visit. The littoral species of marine life to be found on its ocean beaches are very numerous, while the material to be found by dredging in the Bay will supply no end of interesting objects to the student, and in this we have the added interest—that much of this material is not to be found in Port Phillip Bay, although in such close proximity. This fact can be explained by the enormous area of mud flats to be found in Western Port which does not occur in Port Phillip. The mainland, from Stony Point to San Remo, French Island, and the lower portion of Phillip Island, are practically unapproachable except at high tide and at a few landing-places. This is a source of great trouble to those who live along the coast, and who depend upon the water for the means of earning their living. As the tide drains off these flats it forms numerous rivulets, which run into larger channels, and these again run into main channels, which flow into the Bay. As there is a rise and fall of tide ranging from 8½ to 10½ feet, there is a great rush of water, and in consequence some of these channels are very deep, ranging to a depth of 8 fathoms. The mud flats, when systematically searched, are a happy hunting-ground for the naturalist. Certain species of molluscs, crustaceans, &c., revel in this material. Here, for example, we find, encased in mud balls, that beautiful mollusc, *Modiola arborescens*. It was a long time before the peculiar habit of this bivalve was discovered. Occasional specimens were secured in deep water by the dredge, but one day, in a muddy patch, fourteen shells were obtained as the reward of perseverance, and associated with them was also found the equally rare *Modiola victoriæ*. The mud balls in which both these molluscs are encased are wonderfully constructed, being massed together with fibrous material; and, as the shells are very fragile, care has to be used in taking them out of their encasement. For a long time I dredged in vain for the polyzoa *Amathia tortuosa*. One day I amused myself with picking off as much as I wanted from a bank (Reed's Channel) at low tide.

For these reasons this interesting island, which has an area

of about 40 square miles, was thoughtfully chosen by the excursion committee of the Club as the locality for the Easter excursion of 1913; and in response to the call twenty-three members, including several members of the Bird Observers' Club, gave in their names. Twelve of these left Melbourne by the afternoon train on Thursday, 20th March, and duly arrived at Cowes early enough to have tea and make arrangements for the morrow and following days.

Good Friday morning found us profitably working the beach between Cowes and M'Haffie's Rocks, where we found some interesting specimens of Polyzoa, and were fortunate in finding the beautiful *Lichenopora wilsoni*—a specimen of which, with others, may be seen here to-night. It was a revelation to several that such lovely specimens of natural history were to be found so easily. Time passed quickly, and we had to hurriedly leave, as the steamer *Genista* was in sight, and we were anxious to meet the second contingent of field naturalists, who, we found, were true to their colours, as eleven more answered their names, making in all a party of twenty-three, of whom eight were ladies. After a hurried meal, and the weather being eminently suitable, we boarded a motor launch which we had engaged, and, making towards Rhyll, spent the afternoon in dredging in about ten fathoms of water, obtaining a very fair number of Polyzoa and other interesting forms of marine life, and finishing off with about fifty or sixty Trigonias, which, after being carefully cleaned, were distributed among the ladies and others of the party. A demonstration on the mounting of seaweeds was given in the evening, and terminated a well-spent day.

Saturday was set aside for a trip to Cape Woolamai, a four-horse drag carrying the party of twenty-three nicely. The drive was very enjoyable, and we were interested in noticing the numerous birds to be seen on the way. Murray's Mutton-bird rookery was first passed, and then Forrest's and others in rapid succession all the way to the Cape, which was reached about 11.30 a.m. We hastened over lunch, and walked along the beach so as to ascend the Cape from the granite quarry at Red Point. It was from this quarry that the stone was obtained for the Equitable Building in Collins-street. As it now came on to rain, some of the party sheltered, while others elected to push on, so followed a track which skirts the top of the cliffs, and, facing the showers and dodging the numerous Mutton-bird burrows, were not long in arriving at the highest point of the Cape, 322 feet above sea-level. On the way a rock below was pointed out, on which at one time some Silver Gulls, *Larus novæ-hollandiæ*, Steph., had their rookery. A pair of White-bellied Sea-Eagles, *Haliæetus leucogaster*, Gmelin, at

one time had their eyrie on one of these cliffs, but are no longer seen here. At Pyramid Rock, which can be seen in the distance, there was also at one time a pair of these birds breeding. I waded over to this rock one day to inspect the place, and found the remains of the old nest. Oh! that was a most uncanny wade, seaweed, kelp, and thoughts of octopus tentacles occupying my mind all the time, and the breakers, which rolled in from two different directions, had to be closely watched. I was very glad when I got back to land. After feasting our eyes on the fine view to be obtained from the Cape we saw the remainder of the party in the distance, and, joining them, made along the neck of the Cape. Here we noticed that the planting of marram grass to check the sand-drift had in places been eminently successful. Sand-encrusted roots were found in considerable quantities exposed by this drift. These curious formations, popularly known as "petrified wood," were dealt with by Dr. T. S. Hall in an interesting article in the *Naturalist* some years ago (*Vict. Nat.*, xviii., p. 47), when their method of formation was carefully worked out. We now turned towards our camping-ground, and on the way found a number of Mutton-birds which had lost their lives through coming in contact with the barbed-wire fences. We can no longer doubt this fact, for we found a couple of birds which had been unable to free themselves, and thus died a lingering death. We photographed one of these birds, which you will see on the screen presently. It would be a great gain if the State could acquire the whole line of rookeries along the coast to Murray's and do away with these fences. The sand-drifts were a revelation to our party, and we estimated one in particular as being over 120 feet above sea-level, and at an angle of 25° to the water's edge. Arriving at camp, we had tea, and started back towards Cowes. On the way we stopped at Forrest's rookery to ringmark some birds and watch the flight of the incoming old birds. On leaving we had to face a thunderstorm, and, on account of the vivid lightning, had to walk the horses nearly the whole way back, and consequently we did not arrive till just before 10 p.m., but well satisfied with our trip.

Sunday morning was drizzling with rain. Some of us elected to go to church, while others did something else. The afternoon was fine, and, taking the motor-boat, we all went off to see the seals. The sea being calm, we were fortunate in getting quite close to the Seal Rocks, and saw the seals (which number about 400–600) to advantage. A musical interlude on a kerosene tin soon brought them swimming around us. We tacked and tacked again, and at last regretfully left the scene. On one portion of the rocks were about 50 or 60 all by them-

selves. These, we were informed, were not allowed in the sealery, they having failed to mate. We also noticed about 18 or 20 "bulls" by themselves, but could get no explanation about this action. Members may remember that a little time ago a letter was referred to our Club for consideration by the Fisheries Department. Some fishermen complained about the thousands of seals on the rocks, which were eating the fish, &c. At the time I very much doubted this, and corresponded with two well-known residents (both fishermen). One said there may be hundreds of seals, but not thousands; and the other (our motor-man, Mr. Kennon) said "Nonsense! That as for their eating the fish, &c., I go piking around the rocks." Later on the authorities had a visit of inspection, when one or two seals were killed, and on being opened were found to have been feeding on squid, no remains of fish being found in their stomachs. It was thought wise, however, to kill one hundred "bulls," and permission was given to that effect. That permission has not yet been taken advantage of by those who complained. Why? Sealskins at the time of making the complaint were 34s. each; now they are worth about 14s. each. Added to this, while we were at the Nobbies the following day we noticed two fishing boats piking round and about the Seal Rocks. Cowes was reached after a very enjoyable trip back, and the evening was devoted to a demonstration of dry mounting for the microscope, the mounts being distributed amongst the members as mementoes.

Monday morning was showery, but the weather was chanced, and the drag and a buggy were brought into requisition for a trip to the Nobbies. Nothing of special interest was noticed on the way until we arrived at Green Lake, where we had to get out and walk. The sand-drift has been very bad about here in the past, and the lake, which was at one time a fine pool of water, has been very nearly filled in by the blown sand. Towards Cat Bay there is a very interesting example of the so-called petrified wood, but, as we had noticed the Cape Woolamai material, we passed it by. Our walk took us through Mr. P. Whelan's property. There is some talk of buying a strip of this ground and making a proper road. It would be a great boon to the visitors, as the road is very heavy at present. The Nobbies were reached at last, and, while some members lost themselves, others paid a visit to the "Blow-hole." This is not a blow-hole proper, but a cave with a fairly long tunnel. The water, which comes along the gulchway with a heavy swell, rushes into this cave, and the air, becoming compressed in the tunnel, sends the water back with great force and a loud report, the spray at the same time being so divided into minute particles that it looks like vapour. On

visiting the penguin rookery we noticed a considerable number of these birds dead at the mouths of the holes, and wondered at the cause. A few members climbed the large Nobby, and found the top covered with guano. There must be a large quantity of this material—probably a depth of ten feet or more. I often wonder why it is not utilized; perhaps it is not rich enough to pay for removal. After a hurried gathering of Polyzoa off the rocky beach, we journeyed back, and, taking another route, passed Swan Lake. Countless rabbits were seen on the way. These rodents, in spite of trapping, poisoning, hawks, and other means of destruction, are fast getting the upper hand, and are becoming a menace to the residents.

On Tuesday morning some of the party left for Melbourne by the *Genista*, while others decided to stay another day, so as to visit Kitty Miller's Bay and examine the blackfellows' midden there. As I had planned to stay a few weeks longer I bade farewell to the party and went off to Rhyll.

It was regrettable that we had no geologist in our party. Cape Woolamai itself possesses several points of interest, not to mention Sunderland Bight and other well-known places which would have amply repaid a visit.

I am indebted to my co-leader, Dr. Brooke Nicholls, for the following notes on the bird-life of the outing. He says:—"As the result of several trips to Phillip Island just sixty species of birds have been recorded, but of these sixteen are sea or shore birds, leaving forty-four as residents of the island. These correspond very closely with the total of thirty-six species recorded in the *Naturalist* of December, 1911 (xxviii., p. 149), for the Bass Valley by Mr. A. W. Milligan and myself at Easter, 1911. The Bass Valley, it may be mentioned, is situated on the eastern side of Western Port, and at no great distance from Phillip Island. However, as each of our visits to the island and to the Bass Valley was made during the Easter holdiays, observations at other periods of the year would doubtless add to the lists. The absence of the Spotted Ground-bird, *Cinclosoma punctatum*, Lath., from the Phillip Island list, and its inclusion in that of the Bass Valley, is perhaps the most interesting result of the comparison, and, while this bird has not yet been recorded for the islands of Bass Strait, it occurs in Tasmania. The presence of the Emu-Wren, *Stipiturus malachurus*, Shaw, the Orange-tipped Pardalote, *Pardalotus assimilis*, Ramsay, and the Mistletoe-bird, *Dicæum hirundinaceum*, Shaw, upon the island is also of interest. Of the sea-birds found upon the island, the Short-tailed Petrel, or "Mutton-bird," *Puffinus brevicaudus*, Gld., and the Little Penguin, *Eudyptula minor*, Forst., bulk largest in importance. Both these birds are diminishing in numbers every year, and their rookeries are being gradually

thinned out. It will be a surprise to many members of the Club to learn that the penguin is not upon the list of birds protected for some portion of the year. As Phillip Island is practically the last stronghold near the mainland of the Mutton-bird and the penguin, it is time they were afforded full protection in this locality. During the excursion some interesting observations were recorded regarding the penguins. The accompanying plate shows the nest of a pair of these birds, containing a young bird. The nest was some 500 yards inland from the sea, and placed high upon the cliff, amongst the tussocks. There were two openings to the burrow, which is unusual. In the foreground of the picture will be seen numbers of feathers scattered in front of the young bird. These are the shed feathers of the *second* down stage. During recent years it has been found that many birds, especially penguins and petrels, shed two stages of down prior to acquiring the adult plumage. In the penguin the first down is of a fine, silky, hair-like structure. The young bird in the photograph had donned the adult plumage, which is attained prior to its leaving the nest and entering the sea."

Several Club excursions have now been made to Phillip Island or its vicinity, but its treasures for the naturalist are by no means exhausted. Reference may be made by those interested to the reports of these excursions, which contain records and lists of species in various departments of natural history :—Shoreham, Easter, 1902, *Vict. Nat.*, May, 1902 (xix., p. 7); Shoreham, November, 1902, *Vict. Nat.*, December, 1902 (xix., p. 107); Stony Point, Easter, 1908, *Vict. Nat.*, July, 1908 (xxv., p. 52); and Stony Point, Easter, 1909, *Vict. Nat.*, June, 1909 (xxvi., p. 17).

Most of the localities referred to in these reports will be found marked on the map which will accompany this report, and should enable the details of the outing to be easily followed.—Joseph Gabriel.

The Late Mr. C. Stout.—Members will learn with deep regret of the death, at Mildura, on the 18th May, of Mr. Charles Stout. Mr. Stout joined the Club as an associate member in May, 1909, and evinced a keen interest in natural history. Taking up teaching as a profession, he qualified as teacher of Sloyd work under the Education Department, and was recently appointed to Mildura. During the latter part of his membership of the Club he acted as secretary to the juniors, and by his quiet, unassuming manner made many friends. At the April meeting of the Club a resolution was unanimously passed, conveying to him the thanks of the members for the work he had done. His death at the early age of 22 removes a promising teacher from the ranks of the Department.

PLATE II.

Photo. by L. G. CHANDLER.

NEST AND YOUNG OF LITTLE PENGUIN, EUDYPTULA MINOR, FORSTER.

"The Nobbies," Phillip Island.

EXCURSION TO MONT ALBERT AND BALWYN.

THE lowering clouds and subsequent downpour of rain on Saturday morning, 26th April, appeared anything but encouraging for the proposed excursion of the afternoon. As it happened, however, the weather later on was so propitious that a more favourable time for geographic study and a general ramble could hardly have been selected. From the heights of Mont Albert, whence the party of fifteen members and friends started, the Dandenong Ranges were seen in their most fascinating garb, the dark mantle of forest trees being here and there relieved by rolling masses of white and grey cloud, whilst over all extended a veritable "photographer's sky." The clearness of the middle distance and beyond, owing to the refractive condition of the air, enabled the party to pick out the principal heights in the panoramic view of the northern and eastern hills and mountain ranges, and the plains of river denudation, with their outstanding monadnocks, were seen from beyond Heidelberg to Ringwood and Mitcham.

After examining the relation of the overlying sandy cover of the Kalimnan beds to the Silurian bed-rock, the party turned northwood from the reservoir hill, down Elgar-road, in the direction of the Koonung Koonung Creek basin, where the chief objective lay—namely, the volcanic plug in Silurian rock, near Whitethorn-road. On the way down, the low, swampy valleys lying at the foot of the sand-caps of the high-lands were noticed. These valleys are local, temporary base levels of stream erosion, and it was observed that no sooner had the bed-rock been incised than well-developed creek formation ensued. The same phenomenon obtains in the Cheltenham and neighbouring districts, as pointed out recently by Mr. T. S. Hart, M.A. An interesting fact in connection with these swamp valleys is the prevalence, on the better-drained parts, of a flora which originally lived on the sandy area of the higher ground, and which still shows a lingering vitality, on temporary sufferance, in the semi-arenaceous lands at the foot of the sand-caps. As evidence we note the tolerable abundance of the sand-loving Manuka, *Leptospermum scoparium*, on the Silurian slopes of the Kenmare Heights, off the Union-road, and at the foot of Balwyn Hill.

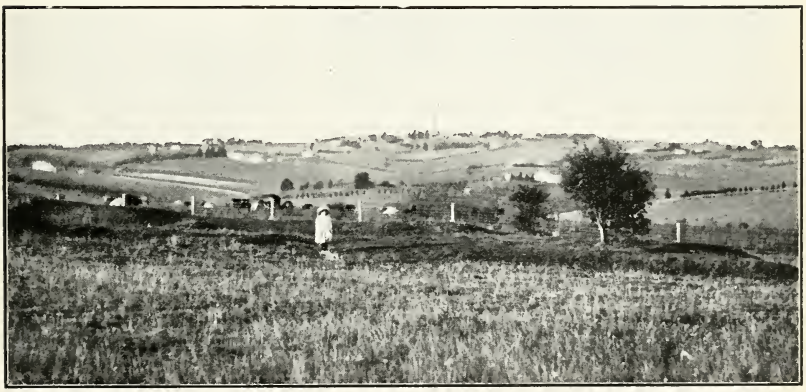
The steep descent from the Reservoir Hill down the slopes of the Koonung Koonung Creek valley was remarkable, and on consulting the contour map we found the fall to be 275 feet from the sand-covered hill at Mont Albert to the creek in Elgar-road, a distance of only two miles. Turning west along Belmore-road where we picked up another member of our party, a walk of a mile or so, partly across paddocks, brought us to the interesting excavation in lava lately described by Mr. A. O. Thiele and myself in the "Proceedings of the Royal Society

of Victoria," vol. xxiv. (N.S.), pt. 1, 1911, pp. 124–134, pls. xl., xli., the precise locality being north of Belmore-road and east of Whitethorn-road. The Silurian bed-rock surrounding the volcanic plug is distinctly indurated, and the effect of contact metamorphism is seen in the highly ferruginous colouration of some of the rock fragments lying around, as when a piece of yellow sandstone is burnt to a red colour. The excavation is, roughly speaking, about 200 by 150 yards in extent. The members of the party noted the difference between this rock and the ordinary bluestone, in that the former occurs in closely jointed rectangular and tabular masses and is decidedly heavier. The hope was expressed by more than one that a further excavation should be made, not only to expose fresher surfaces of the rock, but in order to show the exact relationship of the lava to the bed-rock. Some fairly heavy bags of specimens were secured, as well as smaller chippings for the purpose of making thin rock sections; for, from a petrological standpoint, the lava (a Monchiquite) makes an interesting study. The accompanying illustrations (plate iii.) will give some idea of the present appearance of the excavation, and of the picturesqueness of its sinuation. The return to Surrey Hills station was made by way of Whitethorn-road and across country to Balwyn Hill.—F. Chapman.

The Late Rev. W. Fielder.—Nature students, and microscopists in particular, have lost an enthusiastic helper in the death of the Rev. Walter Fielder, F.R.M.S., on Wednesday, 28th May, at the age of 55. He was elected a member of the Field Naturalists' Club in May, 1890, and in December of the same year was elected to fill a vacancy on the committee. In the following May he took up the secretaryship, in conjunction with Mr. D. Le Souëf during the first year, but from May, 1892, to January, 1894, carried out the whole of the duties. On his retirement in January, 1894, on account of his having undertaken University work, he was presented by his fellow-members with a valuable microscope. He was one of the founders of the Microscopical Society of Victoria, and filled the position of Lecturer and Demonstrator in Physiology and Histology at the University up to the time of his illness. Before making scientific investigations his life work, Mr. Fielder had held several important positions in the Anglican Church, and here also his loss will be greatly felt, as he was ever ready, in the midst of scientific work, to fill a vacant pulpit when called upon.

PLATE III.

EXCAVATION IN PLUG OF VOLCANIC ROCK (MONCHIQUITE), BALWYN.



SITE OF VOLCANIC PLUG AT WHITETHORN-ROAD, BALWYN.
(Figure indicates edge of excavation).

EXCURSION TO MONT ALBERT AND BALWYN.

SOUTHERN NIGERIA : ITS NATURAL HISTORY, &c.

A SPECIAL meeting of the Field Naturalists' Club of Victoria was held at the Independent Church Hall on Tuesday evening, 3rd June, for the purpose of hearing a lecture by Mr. A. E. Kitson, F.G.S., lately principal of the Mineral Survey of Southern Nigeria. The president, Dr. J. A. Leach, occupied the chair, and there was a large attendance of members and friends. The lecturer, who, though absent from Victoria for some years, still retains his membership of the Club, delivered a very interesting address, which was well illustrated with a large series of lantern slides. The geographical and geological features of the country and the distribution of the tribes were briefly indicated, and general remarks made on the climate, rainfall, &c. A short description was given of the physical character of—(1) the crystalline area of Yorubaland and the eastern boundary, with its numerous hills, isolated or in clusters, standing in dissected peneplains ; (2) the low-lying coastal belt, with its mangrove-fringed lagoons and channels ; (3) the sandy coastal plain ; (4) the sand-capped Udi plateau, with its Cretaceous coal-bearing rocks. Several of the interesting types of vegetation were mentioned, among them being the large white lilies and the mauve ground-orchids of the open forests, the lovely white tree-orchid, the valuable timber trees (mahogany and iroko), the wine, oil, and coconut-palms, the cocoa, kola, paw-paw, and rubber trees. A description was given of the oil-palm and the mode of extracting the palm oil of commerce from the fruit. The export value in 1911 of this oil and the kernels of the nut was given as £4,200,000. Most of the people are agriculturists, and their principal food is yams, roasted, or boiled and mashed, or ground into flour. These tubers, their modes of cultivation, preparation, and consumption, were specially described. The fauna is represented by most of the animals of tropical Africa. Among exceptions may be mentioned the rhinoceros and the giraffe, while the lion is rare in the extreme north-west. Among the specially interesting forms are the manatee, the otter, the pangolin, and the hyrax. Fish occur in great numbers, and are of many species, perhaps the most interesting being the weird lung-fishes of the stinking mud-flats of the mangrove region. Freshwater oysters and mussels are common in many streams. Crocodiles are plentiful in most rivers. There are numerous lizards and snakes of various kinds, and a few chameleons. Among the non-venomous snakes are pythons—one kind sacred to the Ibos—and the pretty light-green tree snake. The venomous snakes include the deadly puff-adder, which ejects an irritating fluid into an aggressor's eye, causing agony and temporary blindness ; the black mamba, and the

active, green, banded tree-snake. In the lecturer's experience of these Nigerian snakes he never saw any of them show signs of anger or heard them hiss—a striking contrast, as remarked, to the habit of Australian snakes. Tortoises are fairly numerous. Great land-snails, with shells over six inches long, are plentiful, and, with numerous smaller kinds, are highly relished as food by the natives. The insect world is intensely interesting. Centipedes and brown scorpions are common, and in some districts there are great black scorpions upwards of six inches long. Winged insects are in myriads. The most annoying are mosquitoes, sand-flies, and "sweat flies" (species of bees ?). The most striking beetles are the great irawo, the elephant, the "fire-fly," and the excrement beetles. Other interesting forms are wasps and hornets. Among the ants the most important are the wonderful driver, the forager, and the black and the yellow tree-ants. Termites exist in great numbers, both the mound-building kinds and the ordinary "white ants." The commonest birds are vultures, fish-eagles, hawks, hornbills, owls, grey parrots, partridges, francolins, quail, guinea-fowl, pigeons, doves, weaver-birds, cormorants, plovers, herons, and sandpipers. The water-loving birds are not nearly as plentiful as might be expected. The principal tribes are the Ibo, Yoruba, Sobo, Ibibio, Bini, Ijaw, Ekoi, and Munshi. Among wandering peoples are Hausa traders and pastoral Fulani. Body-marking is practised by many tribes, in some cases with artistic results, in others with quite the reverse. Pale negroes and albinos are not rare. Among the principal occupations of the people are farming, hunting, fishing, trading, cotton cloth making, and working in iron, leather, and wood. In Yorubaland magnetic iron-ore mining and smelting are still carried on, but the smelting of ores of secondary origin in other districts has now ceased. Salt is obtained by filtration and evaporation of brine from springs in marine Cretaceous strata. Throughout the colony the natives are chiefly pagans, but Christian missions have long been at work in some districts, and have many converts. Mohammedanism through Hausa teachers is spreading rapidly among the Yorubas. Government schools have been established in many districts, and in some places are voluntarily built and partly maintained by the local natives. All the tribes have innumerable fetishes and pagan shrines, and they are great votaries of dancing and ceremonies. Trial by ordeal for witch-craft, theft, and other offences is still secretly or openly practised. Human skulls and other bones are displayed in many places, sometimes as fetishes. The present natives of the country are not its aborigines. Those were people of the Stone Age, and the lecturer made the first discovery in that part

of Africa of their stone quarries and stone implements in large numbers. Attention was drawn to the remarkable resemblance of these implements to those of the Australian aborigines. Many of the tribes are very musical, and some have more than crude artistic ability, as shown by their modellings, carvings, drawings, &c. Though the Yorubas and some other tribes are now peaceful, others are not. The Ibo, a hot-tempered but fine tribe, is troubled with internal warfare of various kinds, and the disputes have often to be finally settled by Government troops. Travelling in a tropical country such as Southern Nigeria, where the annual rainfall varies from 35 to more than 170 inches, is necessarily of diverse character, as was shown by the different modes of transport by land and water. The mineral resources of the country comprise gold, silver, tin, lead, zinc, iron, autunite, monazite, and the commoner gem-stones, but chiefly in unpayable quantities as yet known. Vast deposits of valuable brown coal, however, occur, and among the important discoveries made by Mr. Kitson and his colleague, Mr. E. O. Thiele, B.Sc., was that of a valuable black coalfield in the Udi highlands. In conclusion, the lecturer expressed his firm conviction of the future greatness of the colony, and stated that its revenue in 1910 of £2,000,000 had nearly trebled in seven years. He also spoke highly of the assistance given him for two years by his colleague and old friend, Mr. Thiele, another member of the Field Naturalists' Club of Victoria, who is now in charge of a mineral survey in Portuguese East Africa.

The lecture was illustrated by upwards of 140 lantern slides, which showed the different features specially mentioned.

On the motion of Mr. A. D. Hardy, F.L.S., and Mr. W. F. Gates, M.A., a hearty vote of thanks was accorded to the lecturer.

[Further particulars regarding Southern Nigeria will be found in a paper by Mr. Kitson published in the *Journal of the Geographical Society of London* for January last. Mr. Kitson, having completed his engagement in Nigeria, returns to West Africa as Director of the Geological Survey of the Gold Coast.—Ed. *Vict. Nat.*]

About Members.—Mr. T. S. Hart, M.A., for many years Lecturer on Geology and Botany at the School of Mines, Ballarat, has been appointed Principal of the new School of Forestry, established at the State Forest Nursery, Creswick.

We have to congratulate Mr. E. Brooke Nicholls, well known as an enthusiastic bird-lover, on his attainment of the degree of Doctor of Dental Surgery (D.D.S.)

NOTES ON THE ZOOLOGY OF THE GREAT DESERT OF NORTH-WESTERN AUSTRALIA.

By G. A. KEARTLAND.

(*Read before the Field Naturalists' Club of Victoria, 10th Feb.*, 1913.)

As the exploring expeditions led by Colonel Warburton (1873), John Forrest (1874), Ernest Giles (1876), Alex. Forrest (1879), and the Elder Expedition, led by David Lindsay (in 1892), had all traversed Central and North-Western Australia from east to west without finding permanently-running rivers or mountain ranges of much importance, excepting the Macdonnell Ranges, it was considered desirable that an effort should be made to cross the north-western portion from south to north. It must be borne in mind that there is a gap of about 300 miles between the lines traversed by Giles and Warburton, and, as the sand-hills crossing this immense area run W.N.W. and E.S.E., the explorers were most of their time travelling up the valleys between the sand-hills. This led to the suggestion that by crossing the lines mentioned from south to north some good country might be found.

It was recognized that the trip would be a hazardous one, as the camels would have to carry their heavy loads over the sand-hills at right angles. However, in 1896, Mr. Calvert, a wealthy mining speculator, decided to finance an exploring expedition to accomplish this task. Mr. Lawrence A. Wells, then in the service of the Adelaide Survey Department, was chosen as leader. That the selection was a wise one is shown by the fact that, although the party crossed over 700 miles of sand-hill desert, travelling most of the time by night to avoid the heat of the day, they struck the Fitzroy River within a mile of the spot Mr. Wells marked on his map before leaving Adelaide. It was in May, 1896, that Mr. Wells got his party together. Mr. C. F. Wells, a cousin of the leader, was second in command, I was chosen to take charge of the natural history section (embracing botany, zoology, &c.), while Mr. G. L. Jones was responsible for geology and meteorological observations, and had charge of the photographic outfit. James Trainor, as cook, and Bejah and Said Ameer, Afghan camel-drivers, completed the party. We left Adelaide on 24th May, 1896, by the steamer *Waroonga* for Geraldton, W.A., thence by train to Mulawa, where twenty camels were purchased, loads were made up, and a start effected on 13th June. Cue was passed on 25th June, and Lake Way on 16th July.

On 10th August Mr. L. A. Wells, Mr. G. Jones, and Bejah started on a flying trip of about 450 miles, with a view to discovering water and taking notes of the country further north whilst Mr. C. F. Wells, Trainor (cook), Said Ameer, and myself

retraced our track about 10 miles further back to await the return of the advance party, and in order that thirteen invalid camels might be on some good feed and water whilst they were being treated for various ailments. Another reason for retracing our steps was to avoid the poisonous plants, such as Gastrolobium and *Euphorbia Drummondi*, which were so prevalent between Lake Way and Lake Augusta.

Staying on Brookman Creek from 10th August till 14th September, Mr. C. F. Wells and I divided our time between natural history collecting and veterinary operations on the camels. Wide flats extended on both sides of the creek for several miles from the site of our camp. That this neighbourhood had recently suffered from a plague of rats was evident from the fact that every step taken by man or camel sank for about two inches into the surface crust of the ground, which had all been undermined by the rats. I found several places where a few of the rodents remained, and captured a number. They were rather smaller than those found in Melbourne, had larger ears and longer and softer fur. It was fortunate for us that the main body had migrated elsewhere before our arrival. Whilst at this camp I made a fine collection of plants, insects, animals, bird-skins, and eggs, which were, unfortunately, abandoned in the desert later on, when we had to fly for our lives owing to lack of water. Probably the most interesting bird shot here was a Bronzewing Pigeon, in shape and markings exactly like *Phaps chalcoptera*, but less than half the size of that bird. I am certain it was a new species, and trust that the next person to find one may be more fortunate than I was.

On 14th September we resumed our journey, and soon entered the desert proper; and the notes on the zoology of the desert refer to the animals and birds found between this date and the 6th November, when we reached the Fitzroy River. In speaking of North-Western Australia I am alluding to that immense tract of country extending from lat. 27° to 19° and long. 118° to 125°. Nearly the whole of this country is composed of red sand, which, I believe, is formed by the erosion of the ferruginous sandstone hills and table-lands. A few miles north of lat. 26° the country is crossed by innumerable sand-hills invariably running W.N.W. and E.S.E. Sometimes half a mile of flat divides these sand-ridges, but occasionally they were so close together that the leading camels in the caravan were ascending another before the last of the team had descended the previous one. In the valleys between these hills many varieties of Acacia, Grevillea, and tea-tree were seen.

One tree, which we called "native poplar," owing to its foliage resembling that of the well-known European tree, bore an

immense bunch of seed at its apex, which was easily snapped off by giving the tree a sharp shake. This operation was not unaccompanied with danger, as some of the bunches weighed over a quarter of a hundredweight; and as the camels were eager to feast on what they appeared to regard as a luxury, we had to keep out of their way as well. The leaves of this tree tasted very much like those of the Nasturtium. A dry tree of this species was so light, although 20 feet long and two inches in diameter at the base, that it could be grasped at the end and held out horizontally at arm's length. Another remarkable tree was a species of acacia, which grew on a wide flat. The trees were about 10 feet apart, and, although many of them were 25 or 30 feet high, I did not see one over 1½ inches in diameter at the base, and when a section 4 feet long was cut, and the ends bent together in the form of a hoop, it was found that there was only a very slight difference in the thickness of the ends. The few sprays of leaves on the upper part of the tree, which constituted its foliage, could be compressed into a tin pannikin. This is the tree which furnishes the natives with their best spear-shafts, to obtain which they make long journeys in the winter. Occasionally large timber is seen, but most of it is hollow, owing to lack of moisture. On one occasion I was anxious to obtain a piece of hard wood 3 inches x 1 inch in thickness and 15 inches long, and, although I used the axe on large and small trees in all my spare time, it was a week before I was successful. Branches no thicker than a finger were hollow like a piece of piping. Out of one tree-trunk, 17 inches in circumference, we took a brood of four young Rose-breasted Cockatoos by simply tearing an opening with our hands. But I must now speak of the zoology of this country. When I say that it was 737 miles from the last creek (Brookman Creek) where we found water—at which there were Black Duck, Teal, White-eyed and Pink-eared Ducks, Maned Geese, Black-tailed Tribonyx, White-fronted, Pacific, and Nankeen Night-Herons—till we reached the Fitzroy River, you will understand that bird-life was scarce in parts.

When we first entered the sand-hill country we saw several Emu nests, in some of which the eggs had been hatched, but there were others in which the broken shells showed that the dingo or Black-breasted Buzzard had been at work. The dingoes made a hole in the side or end of the egg, and licked out the contents; but where the buzzard had been at work the shells were broken as if struck by a stone, and in two cases a stone over 1 lb. in weight was found amongst the broken shells. Bustards were fairly common, and Southern Stone-Plover were disturbed from the shade of the bushes. Of course, at this time we were within flying distance of water, as the presence

of Bronzewing Pigeons, Little Turtle-doves, Crested Pigeons, and Many-coloured, Cockatoo, Port Lincoln, and Shell Parrots indicated. These birds, together with Galahs and Chestnut-eared Finches, are never found very far from water. Perhaps they knew of some we did not see. Then we passed through mallee scrub in which the Pied, Singing, and Keartland Honey-eaters were numerous, and large flocks of Masked and White-browed Wood-Swallows and White-shouldered Caterpillar-eaters passed over. The absence of seed-eating birds had just been noted, and the conclusion arrived at that we were far from water, when four Alexandra Parrakeets flew across our track. Their slow, laboured flight clearly indicated that they, too, were looking for water. Up to this time the little, swift-flying Hemipode, *Turnix velox*, had been very plentiful, and, where the Triodia was short, I frequently counted from 15 to 20 running about the ground, all within shot had I desired to shoot them; but now they all disappeared.

Further on the only birds seen were the two species of Amytis—*textilis* and *striatus*—Emu-Wrens, Crested Oreoica, and Tricoloured Chat. As these birds are strictly insectivorous, they seemed to derive sufficient moisture from their food. Brown Hawks came whenever we set fire to the Triodia, in order to feast on the lizards which ran from the fire. About this time we found several species of ants and large bugs troublesome. We always made our beds as far as possible from the bushes in order to avoid the ants, but soon after we "turned in" our beds were swarming with them, and then the fun commenced. Lizards of several species, especially a small red-backed variety, ran over us to capture the insects, and many of them were in turn captured and consigned to the spirit bottle. These reptiles were the horror of our Afghans. Just as I was dozing off to sleep after bottling one specimen the camp would be disturbed by Said Ameer yelling out, "Mr. Katland! Mr. Katland! little sennak, go quick!" which meant that he wanted me to capture a lizard (which he called a snake) that ran quickly over his bed.

The days were now intensely hot, about 120° in the shade. Several large iguanas were seen on the sand-hills, but only two snakes, which were non-venomous. After travelling for several days without seeing even a crow or hawk, we came to some timbered country, with the Triodia about three feet high. Here I shot several chestnut-coloured wallabies—an adult male of which only weighed about 3 lbs.—and two species of bandicoots. How they obtained water was at first a mystery, but on wandering near camp I found a quantity of the water-bearing mallee, and in many cases the animals had scratched the sand from the roots, and then, after gnawing through the

wood, had sucked the precious fluid. I took up one of these roots (about two feet long), cut the ends with a sharp axe, and stood it in a pannikin. In ten minutes I had about an egg-cupful of water.

We were now travelling entirely by night and camping during the day. Whilst lying under our shade I saw a little animal—which, I believe, was a phascogale, but which was no larger than a half-grown rat—come out of a hole in a tree within a few feet of where I was lying. I made several unsuccessful attempts to capture it, and it finally retired to its retreat. On the margin of the desert, in some rocky country, I saw a most remarkable kangaroo. It was equal to *Macropus major* in size, but very dark brown—almost chocolate colour—on the upper parts of the body, with paler under parts. You may wonder how these birds and animals obtain food. The Triodia bears a seed very much like small canary seed, which is consumed in large quantities by seed-eating birds, rats, mice, jerboas, and ants. The lizards swallow the ants, and are in turn eaten by the hawks. The Amytis, Tricoloured Chat, Oreoica, &c., find spiders, white ants, and other insects to supply their wants, whilst the honey-eating species obtain their food from many varieties of shrubs, some of which are generally in blossom, and when supplies fail in one district they migrate to another. Whenever a native well is found birds and animals are numerous; but where the country is absolutely dry you may travel for a fortnight without seeing even a hawk or crow.

On the 5th November we required no telling that we had crossed the margin of the desert. The atmosphere was cool, and the herbage had quite a fresh appearance compared with that we had just passed through, and before daybreak on the morning of the 6th we disturbed thousands of Whistling Ducks from the Mitchell grass plains; plover and other waterfowl passed over. As day broke, we sighted two large lagoons, which were practically covered with many species of ducks, coots (Porphyrio), Pigmy Geese, ibises, herons, spoonbills, &c., whilst the margin of the water was alive with little waders, including Snipe, Black-fronted, Red-capped, and Red-kneed Dottrel, &c. In the bushes many small birds were noted, amongst others the beautiful *Ephthianuræ crocea*, *aurifrons*, and *tricolor*. Several species of honey-eaters and Horsfield's Bush-lark was as numerous as sparrows anywhere near Melbourne. The desert was crossed, and all nature, as well as our party, gave way to rejoicing.

ORCHIDS.—Mr. O. H. Sargent, York, W.A., desires to correspond with collectors of orchids, and particularly wants specimens of genus Drakea.

The Victorian Naturalist.

Vol. XXX.—No. 3. JULY 10, 1913. No. 355.

FIELD NATURALISTS' CLUB OF VICTORIA.

The thirty-third annual meeting of the Club was held at the Royal Society's Hall on Monday evening, 16th June, 1913.

In the unavoidable absence of the president and vice-presidents, Professor A. J. Ewart, D.Sc., Ph.D., a past president, was voted to the chair, and about 50 members and visitors were present.

REPORTS.

A report of the excursion to Coburg on Saturday, 24th May, was given by the acting leader, Mr. A. L. Scott, who said that there was a moderate attendance of members. The party proceeded east along Bell-street, across the Merri Creek, and, taking the cross road, studied the appearance, in plan and section, of the Silurian strata there exposed. The bad lands beyond were then investigated. Some of the holes in these miniature canyons were nine feet deep, with interesting ramifications of caves and underground water-courses. The water-shed models higher up were next visited. On reaching the creek, the columnar basalt, the tesselated pavement, and the contact of the basalt with the bed-rock were noted in passing.

A report of the excursion to the Royal Park railway cutting on Saturday, 14th June, was given by the leader, Mr. A. L. Scott, who stated that an examination was made of the stratigraphical relationship of the section, and its probable history discussed. The effects of weathering were noted, and a few fossils were found. The weather was perfect, and those present spent a very pleasant afternoon.

ELECTION OF MEMBERS.

On a ballot being taken, Messrs. L. G. Büchner, University, Carlton, and W. R. Grimwade, Orrong-road, Toorak, were duly elected as ordinary members, and Master B. P. Sutton, Rathdown-street, North Carlton, as a junior member, of the Club.

ANNUAL REPORT.

The hon. secretary, Mr. J. T. Hamilton, F.L.S., read the thirty-third annual report, for the year 1912-13, which was as follows:—

"To the Members of the Field Naturalists' Club of Victoria.

"Ladies and Gentlemen,—Your committee have much pleasure in submitting for your consideration the thirty-third annual report, showing the operations of the Club during

the year ending 30th April, 1913, and in offering their congratulations on the satisfactory manner in which the affairs of the Club have progressed during that period, and for its continued prosperity.

"The year just closed may be considered a normal one, no very noteworthy events in connection with the Club's work having taken place.

"The total membership at the end of the year was 287, which shows a decrease of 3 when compared with the previous year. An analysis of membership gives the composition as follows:—6 honorary members, 2 life members, 147 ordinary members, 64 country members, 3 associate members, and 65 junior members.

"While regretting the reduced total, satisfaction is gained from the fact that the number of new members elected exceeded the resignations, and the slight falling off was brought about by removing from the roll the names of several whose subscriptions have been for some time in arrears.

"It is with deep sorrow that we have to record the death of three of our members. On the 21st September Mr. Francis Barnard passed away at the age of 89. His death removes another name from the list of the Club's foundation members and an expert microscopist from the ranks of science. In the same month the death of Dr. J. C. Cox, of Sydney, one of our hon. members, was announced, thus bringing to a close the labours of another enthusiastic scientist. His selected sphere of work was conchology, of which he was a recognized authority. We regret also the death of Mrs. Cudmore, who had been in membership for seven years.

"The attendance of members and visitors at the ordinary monthly meetings has been well maintained, the average being about 60. Among the many visitors throughout the year we may mention the names of Prof. Josephine E. Tilden, of the University of Minnesota, Minn., U.S.A., Mr. A. G. Hamilton, of Sydney, N.S.W., besides several country members, each of whom was cordially welcomed.

"The papers read at the monthly meetings during the year numbered 21, being one less than the previous year. Of these, 10 dealt with zoological subjects, 8 with botany, and 3 with geology, and most of which have been published in the *Victorian Naturalist*. The authors were—Miss J. Raff, M.Sc., Messrs. J. W. Audas, F.L.S. (two), F. G. A. Barnard, F. Chapman, A.L.S. (three), St. Eloy D'Alton, C.E., H. W. Davey, F.E.S., C. French, jun., C. J. Gabriel, J. H. Gatliff, J. C. Goudie, A. D. Hardy, F.L.S., G. A. Keartland, R. Kelly, J. A. Kershaw, F.E.S., G. Lyell, jun., F.E.S., D. J. Mahony, M.Sc., W. L. May, J. G. O'Donoghue, F. Pitcher,

Prof. W. Baldwin Spencer, C.M.G., M.A., P. R. H. St. John, and G. A. Waterhouse, B.Sc., F.E.S.

"In addition to the papers, an illustrated report of the Club's Christmas camp-out at the National Park, Wilson's Promontory, was given by the leader, Mr. J. A. Kershaw, F.E.S., to whom members are much indebted; while at the July and September meetings illustrated lectures were delivered by Dr. T. S. Hall, M.A., and Mr. J. T. Hamilton, F.L.S., respectively.

"The natural history notes read at monthly meetings have been of much interest and value to members; but there is room for considerable extension along that channel. At the September meeting of the Club a special exhibition of Acacias was held, and some fine collections of species were exhibited.

"The annual exhibition of wild-flowers was held in connection with the October meeting, but, owing to the lateness of the date (14th) the display was not quite equal to those of previous years.

"The programme of about 30 senior excursions was for the most part carried out successfully, the outings on the whole being well attended, and, it is hoped, profitable to members. After an interval of seven years, the National Park, Wilson's Promontory, was revisited during the Christmas holidays (26th to 31st December) by a party of thirteen under the leadership of Mr. J. A. Kershaw, F.E.S. Attention was directed mainly to the Vereker Range and its environs. A full report, with illustrations, appeared in the *Victorian Naturalist* for March, 1913. An extended excursion comprising twenty-three members, including several members of the Bird Observers' Club, was also held at Phillip Island at Easter, the leaders being Mr. J. Gabriel and Dr. E. B. Nicholls. On that occasion valuable data regarding Mutton-birds and penguins were obtained.

"The attendance at junior excursions has been somewhat discouraging of late to the respective leaders, and this matter has engaged the attention of your committee. By some members it was deemed advisable to discontinue the practice of holding special excursions for juniors. After due consideration, however, it was decided to make an effort to revive interest in this branch of our work, and Mr. J. L. Robertson, M.A., has been asked to accept the position of organizing superintendent, with Master Karl Glance as secretary in place of Mr. C. Stout, who was obliged to tender his resignation owing to his transfer to the country towards the close of the year.

"The twenty-ninth volume of the Club's journal and magazine, the *Victorian Naturalist*, has been published and duly issued to members, &c. A pleasing feature of the volume is

the increased number of illustrations it contains, which, while adding to the value of the various papers, also contributes largely in the diffusion of scientific knowledge. The editorial work has remained in the hands of Mr. F. G. A. Barnard, who, by sacrifice of time and much labour, has placed it on such a high level of worth, and the very best thanks of the Club are due to him for the able manner in which he has conducted this section of its work.

"Through its journal, the influence of the Club in the development of science is becoming widely appreciated. Its advice and co-operation on scientific matters have been sought by kindred societies as well as individuals all over the Commonwealth, and that its usefulness has been by no means restricted to this country is evidenced by the fact that many applications to exchange publications have been received from learned societies in various parts of the world.

"A report of the plant-names sub-committee has been furnished by the hon. secretary, Dr. C. S. Sutton, and is as follows:—'Since last annual meeting the plant-names sub-committee has met eleven times, and has now almost completed the provisional naming of the plants of the Victorian flora. Only the small section, Myoporinæ to Epacrideæ remains incompletely dealt with, and this, it is expected, will be finished in the course of the next two meetings. The work of the sub-committee is thus well ahead of the printer, for, unfortunately, space could be found in the *Journal of Agriculture* for only a small portion of the matter ready for publication—two small sections only, comprising Hibbertia to Amarantaceæ, appearing in the July and September issues last year. The vernaculars for the eucalypts and other trees have, however, found a place in the Forestry Supplement to the May number of the *Education Gazette*. In revising the names for the eucalypts the sub-committee was fortunate in having the assistance of Mr. H. Mackay, Conservator of Forests, at a special meeting, and the list, as at present adopted, has his approval. This list, it was thought, would be considered at the last inter-State conference on forestry, held here in November last, but time did not permit of this, and no doubt it will receive attention when the heads of the State Forestry Departments meet again this year.'

"By resolution of your committee, Messrs. Leach, D.Sc., J. A. Kershaw, F.E.S., and F. Wisewould were appointed to represent the Club on the Council of the Australasian Association for the Advancement of Science for the session held during January, 1913, at the Melbourne University. Many members also attended the meetings, and doubtless benefited by taking part in the deliberations of the Congress, as well as in meeting and exchanging notes with fellow-investigators from other States

"During the year several members have been vigilant in the interests of bird protection. Mr. J. Gabriel has repeatedly drawn attention to the dangers of barbed wire fences in the neighbourhood of Mutton-bird rookeries, and has spared no effort in order to have these removed. Mr. G. A. Keartland and Dr. J. A. Leach represented the Club at a conference respecting the close season for quail, and endeavoured to obtain an extension of protection during the breeding season. The attention of the Customs Department has also been drawn to a press report of the export to Europe of large numbers of Emu skins and Lyre-birds' tails.

"In connection with the Wattle Day celebrations, your committee have had occasion to express in the public press its strong disapproval of the ruthless despoliation which accompanies the preparations for its observance, and greatly fear that this movement will tend towards the destruction rather than the preservation of the wattle.

"Your committee are glad to record the successful establishment of a Victorian Branch of the Australian Forest League, the aims and objects of which are the maintenance intact and protection of our present forest reserves, the reafforestation of denuded areas, the fostering of tree-planting generally, &c., and which it is hoped will lead to a deeper appreciation of the value of our indigenous trees from both an economic and scientific aspect. Following upon the announcement that a large area of the National Park, Wilson's Promontory, had been devastated by fire, and in order to prevent the destruction of the native flora, a strong protest was made to the Committee of Management against the further use of the National Park as a grazing area, with the result that the Committee directed that all stock should be removed from the park after June, 1913.

"It is gratifying also to note that additional areas are being set apart as sanctuaries for the protection of native animals and birds. Since 1st May, 1912, the following public and private sanctuaries have been proclaimed:—Allotments 26 and 27 of section A of the parish of Moorabool West; Epsom racecourse (Bendigo); Carngham estate (Smythesdale), for wild ducks and teal only; State forests in the counties of Anglesey, Evelyn, and Buln Buln; Frankston and Langwarrin Timber Reserve (Frankston); Yarra Yarra golf links (Rosanna); Central Riding of the Shire of Benalla; Turkeeth or Forrest Salt Lake (Ondit); Main Goulburn-Waranga Channel (near Murchison); Greenvale Sanatorium; Lake Kennedy (Hamilton); Lake Moodemere (Rutherglen); Lake Pertobe (Warrnambool); Portland Botanic Gardens and adjacent areas; Lake Purrumbete (Camperdown); Milangil Sweet Lakes and adjacent lands (parish of Taaraak);

Lake Terang; part of Crown allotment B of section 3 of parish of Tooroumrong (near Whittlesea); while portion of the parish of Corinella and 'Yakatoon,' Seville, are in course of being proclaimed.

"The hon. treasurer's report will show that the Club's income has been economically administered, and, notwithstanding the increased cost of producing the *Naturalist*, the financial position is satisfactory, and is still on a sound basis.

"The accessions to the library have rendered it necessary to purchase and install another large bookcase, but this additional article of furniture will remain a valuable asset, and, besides facilitating the work of the hon. librarian, will be the means of making many additional reference works and the proceedings and transactions of scientific societies available for consultation and the use of members engaged in various researches.

"The hon. librarian reports that during the past year the Club's library has been augmented by 180 volumes and separate parts, 52 of which were purchased by the Club; the remainder were received in exchange. In addition to the above, numerous bulletins and papers were received from the Smithsonian Institute, the Royal Botanical Gardens, Kew, England, and from several University libraries of U.S.A. The average number of borrowers has been well maintained, although the number is not yet so large as the Club membership deserves it to be. During the year over 30 volumes have been bound, and several completed volumes are now ready for the binder. The committee have also authorized the purchase of a new bookcase, and it is now hoped to fully display the numerous volumes which the library contains for the benefit of the members. The remarks of Dr. Hall during the year, drawing the attention of members to the value of the scientific journals received by the Club, have had an encouraging effect on the number of borrowers.

"The Club is again grateful to the several authors of papers, contributors of nature notes, and exhibitors of specimens at the monthly meetings, and to leaders of excursions. Its special thanks are also due to Messrs. Coghill and Haughton for the use of their offices for committee meetings.

"In conclusion, your committee would urge all members of the Club to do their utmost to further its interests in every possible way, thereby materially helping to carry out its fundamental objects, which are to foster and stimulate the study of natural science in all its branches.

"On behalf of the committee,

"J. A. Leach, *President.*

"Jas. T. Hamilton, *Hon. Secretary.*

"Melbourne, *2nd June*, 1913."

FINANCIAL STATEMENT.

The hon. treasurer, Mr. G. Coghill, read the financial statement for 1912-13, which was as follows:—

RECEIPTS.

To Balance, 30th April, 1912						£91	18 8
,, Subscriptions—							
Ordinary Members ...	£111	10	0				
Country Members ...	24	5	6				
Associates	2	13	9				
Juniors	1	16	0				
				£140	5 3*		
,, *Victorian Naturalist*—							
Subscriptions and Sales	7	10	3				
Subscriptions in advance	0	17	0				
Advertisements ...	7	0	0				
Reprints	4	1	0				
				19	8 3		
,, Sales of Badges ...			...	0	7 0		
,, Donation returned ...			...	1	1 0		
,, Interest, Savings Bank			...	3	5 0		
						164	6 6
						£256	5 2

*Subscriptions :—Arrears, £24 15s. ; 1912-13, £106 14s. 3d. ; 1913-14, £8 16s. —total £140 5s. 3d.

EXPENDITURE.

By *Victorian Naturalist*—							
Printing	£81	12	9				
Illustrating	18	8	8				
Free Reprints	7	1	6				
Reprints	4	7	0				
				£111	9 11		
,, *Victorian Naturalist*—							
Wrapping and Posting ...			...	14	10 8		
,, Rooms—Rent and Attendance ...			...	13	13 3		
,, Library—Books ...	2	10	0				
Periodicals ...	5	15	0				
Binding ...	5	2	6				
Insurance and Postage	1	7	6				
				14	15 0		
,, Hire of Lantern			...	2	5 0		
,, Printing and Stationery ...			...	12	19 6		
,, Postages, &c.			...	5	9 8		
,, Advertising, Bank Charge, &c. ...			...	1	9 6		
,, Subscription—Flinders Memorial			...	1	1 0		
						177	13 6
,, Balance in Savings Bank ...			...	92	19 10		
Less Debit to London Bank ...			...	14	8 2		
						78	11 8
						£256	5 2

G. COGHILL, *Hon. Treasurer.*
30*th May*, 1913.

Audited and found correct.

D. BEST,
J. STICKLAND, } *Auditors.*

13*th June*, 1913.

The following statement of assets and liabilities was also read:—

ASSETS.

Balance—Savings Bank	£92 19 10		
Less Debit to London Bank	14 8 2		
		£78	11 8
Arrears of Subscriptions (£56), say... ...	...	40	0 0
Arrears for Reprints	...	2	12 0
Badges on hand	...	1	8 0
Library and Furniture (Insurance Value) ...	...	150	0 0
		£272	11 8

LIABILITIES.

Subscriptions paid in advance	£9 13 0

The report and financial statement were received, on the motion of Messrs. A. D. Hardy, F.L.S., and D. Best.

In the discussion which followed, Mr. G. Coghill said that, personally, he was not in agreement with the clause relating to the Wattle Day celebrations, as in his opinion the movement would in time engender a love for the wattle.

Mr. D. Best said that he was glad to hear that additional public sanctuaries for native game had been set apart, and thought that owners of private property should be urged to do likewise.

Mr. A. D. Hardy supported Mr. Best's view, and spoke also of the good work that had been accomplished by the plant-names sub-committee.

Mr. W. F. Gates, M.A., in moving the adoption of the report, &c., congratulated the committee on their year's work.

Mr. F. Pitcher, in seconding the motion for the adoption of the report, said that the best thanks of the Club were due to the retiring secretary, Mr. J. T. Hamilton, F.L.S., who had served admirably.

The motion was then put to the meeting and was carried unanimously.

ELECTION OF OFFICE-BEARERS.

There being no other nominations, the following office-bearers were duly elected:—President, Dr. J. A. Leach; vice-presidents, Mr. J. A. Kershaw, F.E.S., and Dr. C. S. Sutton; hon. treasurer, Mr. G. Coghill; hon. librarian, Mr. W. G. Mackintosh; hon. editor, Mr. F. G. A. Barnard; hon. secretary, Mr. J. R. Tovey; hon. assistant secretary and librarian, Mr. J. G. O'Donoghue.

On a ballot being taken for five members of the committee, the following were duly elected:—Messrs. F. Chapman, A.L.S., J. Gabriel, A. D. Hardy, F.L.S., F. Pitcher, and J. Searle.

On the motion of Messrs. Strickland and Gates, a hearty vote of thanks was accorded to the retiring office-bearers.

PAPERS READ.

1. By Mr. A D. Hardy, F.L.S., entitled "The Algæ of the Flamingo Pool, Zoological Gardens, Melbourne."

The author remarked that the Melbourne Zoological Gardens contain several pools of water supplied from the Yan Yean and Maroondah systems, but special attention was drawn to the pool in the Flamingo enclosure, the water of which is coloured grass-green for the greater part of the year. Microscopical examination disclosed the fact that this colour is due to microscopic plants of a few species but in prodigious numbers. Some of the species are cosmopolitan, and may be found in the Yan Yean, but others are comparatively rare, particularly one, which has hitherto been found only in Burmah. Sometimes one species dominates the pool, but later another will attain pre-eminence, and again, at a later stage, these may be absent or rare in the presence of a totally different plant. Towards midwinter, however, the microflora decreases rapidly and animal organisms increase in inverse proportion. The paper was illustrated by means of blackboard diagrams.

Prof. Ewart said it was evident that the author had been making some interesting observations. He thought that the Zoological Gardens would be a good place to find microscopical objects of great interest. These might be carried there by air current or upon animals imported from other countries. A specially interesting fact was the succession of life in pools which has always been a difficult problem to solve. One suggestion put forward was that one set of organisms poisoned the water so that forms inhabiting the medium subsequently could not live for any length of time in it, just as it was thought that one crop poisoned the ground for another. As a matter of fact there was no evidence in support of the theory, as has been shown by chemical analysis. A probable factor was temperature. Several algæ have well-defined temperature limits, and can only grow at their best at one particular temperature. Change of temperature affects the supply of oxygen and carbon dioxide, and this in turn affects the food supply of the algæ, hence the predominance or absence of certain forms at different periods.

Mr. J. Stickland said he had seen some of the species in other localities, and had also observed the now newly recorded Euglena.

Mr. J. Searle mentioned that he had found two of the common species mentioned by the author in Lake Catani, Buffalo Mountains.

2. By Mr. O. Sargent, entitled "A Western Australian Form of *Prasophyllum australe*" (communicated by Prof. A. J. Ewart, D.Sc.)

The author stated that at intervals, in the vicinity of York, W.A., specimens of a Prasophyllum had been collected, very similar to *P. australe*, but it was only recently that he had been able to compare them with fresh undoubted specimens of *P. australe* forwarded to him by Dr. Rogers, of Adelaide. He found the Westralian specimens to be larger, more robust, and more richly coloured. All of these differences he considered could be attributed to habitat. He then referred to other species which could be found growing in totally different soils and conditions, and suggested that certain experiments should be undertaken, with the view of gaining information on this point.

Prof. Ewart stated that the author was engaged in a very useful work, and urged field naturalists in Victoria to undertake similar observations.

Owing to the lateness of the hour, a paper by Mr. H. B. Williamson, entitled "Botanical Notes on Mildura," was held over until next meeting.

EXHIBITS.

By Mr. J. W. Audas, F.L.S.—*Cytisus linifolia*, Lam., Flax Broom. A native of the Mediterranean regions, now naturalized in Victoria and spreading rapidly in the Eltham and Pakenham districts.

By Mr. J. Booth, B.Sc.—Species of mistletoe, *Loranthus celastroides*, Sieb., parasitic on *L. pendulus*, itself parasitic on a eucalypt, collected near Buckland Gap; also section of the junction of the two mistletoes.

By Mr. F. Cudmore.—Black and White Ringed Snake, *Vermicella annulata*, from lower Darling River, N.S.W.

By Mr. C. J. Gabriel.—Marine shells, *Latiaxis japonicus* Dunker, from Japan; *L. lischkeana*, Dunker, from Japan; *L. mawæ*, Gray, from Hong Kong; and *Pecten keppelliana*, Sowerby, from Cape Verde Island.

By Mr. F. Pitcher.—Section of stem of English Oak, showing growth over barbed wire, from a tree recently cut down in the Melbourne Botanic Gardens.

By Mr. J. Searle.—Freshwater Hydra (living), single and in budded colonies.

By the Curator, Botanic Gardens, Melbourne.—Fruiting branches of Lilly-pilly, *Eugenia smithii*, also *Hakea verrucosa*.

By Mr. H. B. Williamson.—Thirty-six dried specimens of plants collected at Mildura, including two new to Victoria; also photographs of Mildura.

After the usual conversazione the meeting terminated.

ON SOME INVESTIGATIONS INTO THE MOLLUSCAN FAUNA OF THE FURNEAUX GROUP.

By W. L. MAY.

(Communicated by A. H. E. Mattingley, C.M.Z.S.)

(*Read before the Field Naturalists' Club of Victoria, 14th April,* 1913.)

IN November last I joined the Ornithologists' Union on their trip to the Furneaux Group,* and made the most of every opportunity to study the mollusca. Owing to the great difficulty of getting about from place to place, the great extent of the archipelago, and the little time available, not very many places were visited. On the whole, the most prolific spot was the vicinity of the native settlement, where we were camped; more time was also available for its examination. I also visited Beagle, Babel, Cat, and Forsyth Islands, and Lady Barron, on the south coast of Flinders Island. I have also examined a small collection made at Kangaroo Island, to the east of Flinders Island.

The shells of these islands belong to the Southern Australian province, but the assemblage, so far as investigated, is interesting as being at the point of contact of the north and east coasts of Tasmania and the south-eastern extremity of Australia, and showing species that are common to all these divisions, but some of which are only known from one or other of them. No species peculiar to the islands was seen except a land snail, *Helix barrenensis*, Petterd, which was plentiful on Babel Island, but not seen elsewhere. The Chitonidæ showed three Australian species not previously recorded for Tasmanian waters. Two others were only known from the north-west coast. The ubiquitous *Ischnochiton crispus*, Reeve, was fairly common, and also *I. mayi*, which is an east coast species. On the other hand, *C. pellis-serpentis*, Quoy and Gaim., usually so abundant on most of our coast-line, was represented by a single specimen on Beagle Island. *I. australis*, Sow., and *Plaxiphora petholata*, Sow., were plentiful. *Mytilus erosus*, Lamk., is the common mussel there, being equally at home in the sandy mud-flats or attached to rocks. I only know of two other Tasmanian localities—viz., Blackman's Bay (in the south) and on the north-west coast. The two species—*M. planulatus*, Lamk., and *M. rostratus*, Dunker—so common in the southern bays were not seen. An interesting record is *Glycimeris flammea*, Reeve, which has been traced down the eastern Australian coast, and as far as Lakes Entrance, Gippsland. It occurred on Forsyth Island, at the south-east point

* An excursion party from the Field Naturalists' Club of Victoria visited the Furneaux Group in November, 1893. A report of the visit, with a map of the group, appeared in the *Naturalist* for February, 1894 (x., p. 167).—ED. *Vict. Nat.*

of Barren Island. A Port Phillip species, *Mesodesma nitida*, Desh., was common near the settlement, and *Chione peronii*, Lamk., at Lady Barron, both new records. At Forsyth Island valves of *Mactra pura*, Desh., and *Tapes galactites*, Lamk., were common. These north coast shells have not been recorded for our east coast. Several small species of Marginella occurred here also, which are found down the eastern coasts, but not along the north. *Haliotis nævosa*, Mart., was found there, and was apparently plentiful; its place was taken at the settlement by *H. albicans*, Quoy and Gaim., and *H. emmæ*, Gray, which do not appear on the east coast. A northern form, *Stomatella imbricata*, Lamk., was plentiful in a rock pool near the settlement; it has not been recorded further east. *Thalotia conica*, Gray, and *Clanculus dunkeri*, Koch, were plentiful, and are South Australian forms; the former is also found at Circular Head, but is not so far known from any other part of our coast. *Semele exigua*, A. Ad., was common at the settlement, and this is perhaps its only extra-Australian locality. Three species which here reached a maximum development in size are *Tellina decussata*, Lamk., *Macoma mariæ*, Ten.-Wds., and *Patella limbata*, Phil.

The following is a complete list of the species observed, numbering 152; no doubt the number could be largely added to by further search :—

Argonauta nodosa, Sol. — Several specimens seen in local collections.

Sepia (sp. ?)—A large shell of this genus was very plentiful on the beaches near the settlement.

Murex triformis, Reeve.—Several dead and one small living specimen seen.

Trophon goldsteini, Ten.-Wds.—A single living specimen near settlement.

Trophon petterdi, Braz.—One specimen, Barren Island.

Thais succincta, Mart.—A smoothish form was seen.

Agnewia tritoniformis, Blain.—A single specimen seen.

Sistrum adelaidensis, Cr. and Fis.—Fairly common.

Lotorium quoyi, Reeve.—A few.

Fasciolaria coronata, Lamk.—Common, but rather small.

Cominella costata, Quoy and Gaim.—A few seen.

Cominella lineolata, Lamk.—Common everywhere, and extremely variable in size, form, and colour. The largest were on Babel Island, where they were red-spotted.

Nassa fasciata, Lamk.—Common at the settlement.

Nassa jacksonensis, Quoy and Gaim.—Forsyth Island.

Nassa pauperata, Lamk.—A few seen.

Nassa paupera, Gould.—A few.

Voluta undulata, Lamk., is found in the mud-flat at the settlement, and also its white variety, *sclateri*, Cox.
Lyria mitræformis, Lamk.—One specimen in a local collection.
Mitra pica, Reeve.—Several amongst stones at low tide.
Marginella muscaria, Lamk.—Forsyth and Babel Islands.
Marginella pygmæa, Sow.—Forsyth and Kangaroo Islands. At the latter occurred a short, broad variety.
Marginella tasmanica, Ten.-Wds. — Forsyth and Kangaroo Islands.
Marginella johnstoni, Petterd.—Common at Forsyth Island.
Marginella altilabra, May.—A worn specimen at Forsyth Island; previously only known from 50 to 100 fathoms.
Marginella connectans, May.—Forsyth Island; one specimen.
Marginella geminata, Hedley.—Forsyth Island; one specimen.
Marginella ovulum, Sow.—Forsyth Island; two examples.
Marginella pumilio, Tate and May.—Forsyth Island; one perfect specimen.
Erato lachryma, Gray.—Forsyth and Kangaroo Islands; two.
Ancilla marginata, Lamk.—A few worn examples.
Pyrene semiconvexa, Lamk.—Kangaroo Island.
Pyrene austrina, Gask.—Kangaroo Island.
Pyrene tenuis, Gask.—At settlement; not common.
Pyrene menkeana, Reeve.—Forsyth and Kangaroo Islands.
Pyrene atkinsoni, Ten.-Wds.—Forsyth Island.
Pyrene angasi, Braz.—Forsyth Island.
Conus anemone, Lamk.—Fairly common.
Conus rutilus, Menke.—Forsyth Island; one bleached specimen.
Drillia beraudiana, Crosse.—Under stones, Barren Island.
Mangilia vincentiana, Crosse.—Forsyth Island.
Mangilia picta, Ad. and Ang.—Kangaroo Island.
Mangilia australis, Ad. and Ang.—Kangaroo Island.
Cythara compta, Ad. and Ang.—Kangaroo Island.
Daphnella (?) *harrisoni*, Ten.-Wds.—Forsyth Island.
Cancellaria gravosa, Sow.—Barren Island.
Cancellaria spirata, Lamk.—Forsyth Island.
Cypræa angustata, Gmel.—Barren Island.
Trivia australis, Lamk.—Barren Island.
Hipponyx australis, Lamk.—Common; parasitic on Mytilus, Fasciolaria, &c.
Hipponyx antiquatus, Linné.—Barren Island.
Thylacodes sulcatus, Lamk.—Alive on rocks at Lady Barron.
Scala aculeata, Lamk.—Kangaroo Island: one specimen.
Eulima indiscreta, Tate.—Forsyth Island.
Eulima coxi, Pilsbry.—Forsyth Island.
Eulima orthopleura, Tate.—Kangaroo Island.
Turbonilla hofmanni, Angas.—Kangaroo Island.
Turbonilla beddomei, Petterd.—Forsyth Island.

Plesiotrochus monachus, Crosse.—Forsyth and Kangaroo Islands.
Cerithium icarus, Boyle.—Forsyth Island.
Bittium granarium, Kien.—Forsyth Island.
Bittium diemenensis, Quoy and Gaim.—Forsyth Island.
Triphora granifera, Braz.—Forsyth Island.
Litorina mauritiana, Lamk.—Barren Island, &c.
Risella melanostoma, Gmel., var. *plana*, Quoy and Gaim.—Barren Island; plentiful.
Risella nana, Lamk.—Barren Island.
Truncatella scalarina, Cox.—Common.
Rissoa petterdi, Braz.—Barren Island, on beach.
Rissoa tenisoni, Tate.—Forsyth Island.
Rissonia elegantula, Angas.—Kangaroo Island.
Nerita melanotragus, Smith.—On rocks.
Cyclostrema harriettæ, Petterd.—Forsyth Island.
Liotia australis, Kien.—Forsyth Island; one juvenile.
Phasianella australis, Gmel.—Common at settlement.
Phasianella variegata, Lamk.—A few seen.
Phasianella ventricosa, Quoy and Gaim.—At settlement, amongst rocks.
Turbo undulatus, Chem.—Common amongst rocks at low tide. Aboriginal name, "Warriner."
Astralium aureum, Jonas.—On rocks, Barren Island.
Clanculus dunkeri, Koch.—Plentiful on beaches at settlement, Lady Barron, &c.
Clanculus plebeius, Phil.—Forsyth Island.
Clanculus ochroleucus, Phil.—Forsyth Island: a single specimen. A new record for Tasmania.
Phasianotrochus eximius, Perry.—Found on kelp. The native name is "Merriner." This and the following "kelp shells" are much used for making necklaces, &c., the epidermis being first removed by acid.
Phasianotrochus irisodontes, Quoy and Gaim.
Thalotia conica, Gray.—Common on beach at settlement.
Calliostoma meyeri, Phil.—Barren Island.
Minolia prodicta, Fischer.—Forsyth Island.
Gibbula coxi, Angas.—Forsyth Island.
Monodonta constricta, Lamk.—Common.
Monodonta australis, Chem.—Common.
Euchelus baccatus, Menke.—Common.
Stomatella imbricata, Lamk.—Common under stones near settlement; not recorded for our east coast.
Gena nigra, Quoy and Gaim.—A single specimen near settlement.
Haliotis albicans, Quoy and Gaim.—Common under rocks near settlement.
Haliotis nævosa, Mart.—Forsyth Island.

Haliotis emmæ, Gray. — Under rocks near settlement; two specimens.
Subemarginula rugosa, Quoy and Gaim.—Common.
Patella limbata, Phil.—Common and large. A specimen from Tinkettle Island measures $3\frac{5}{8}$ inches long by 3 inches wide and $1\frac{1}{4}$ inches high, and is a record for size that will be hard to beat.
Patella stellæformis, Reeve.—Barren and Kangaroo Islands.
Patella ustulata, Reeve.—Babel Island.
Acmæa alticostata, Angas.—Babel Island.
Acmæa calamus, Cr. and Fis.—Forsyth Island.
Ischnochiton sulcatus, Quoy and Gaim. — Common in rock pool near settlement. A new record.
Ischnochiton ustulatus, Reeve.—Common with the last; also a new record.
Ischnochiton cariosus, Pils.—Lady Barron and Forsyth Islands.
Ischnochiton contractus, Reeve.—Common near settlement.
Ischnochiton crispus, Reeve.—Fairly common, but small.
Ischnochiton australis, Sow.—Forsyth Island.
Ischnochiton mayi, Pilsbry.—Beagle Island.
Plaxiphora petholata, Sow.—Common near settlement.
Acanthochites bednalli, Pils.—Beagle Island.
Acanthochites asbestoides, Smith.—Not common.
Cryptoplax striatus, Lamk.—Common and large, especially at Lady Barron.
Chiton jugosus, Gould.—A few small examples.
Chiton pellis-serpentis, Quoy and Gaim. — Beagle Island; a single specimen.
Chiton tricostalis, Pilsbury. — Two specimens—one each at settlement and Lady Barron.
Chiton calliozona, Bednall. — Near settlement; one small specimen, the first living example of this Chiton taken in Tasmanian waters.
Lorica volvox, Reeve.—Taken near settlement; a new record. The specimen was small.
Leucotina costa, A. Ad.—Forsyth Island.
Bulla australis, Gray.—Barren Island. Several specimens. Said to be plentiful on Tinkettle Island.
Haminea brevis, Quoy and Gaim.—Barren Island.
Haminea tenera, A. Ad.—Barren Island.
Salinator fragilis, Lamk.—On mud-flats.
Marinula patula, Lowe.—Barren and Kangaroo Islands.
Siphonaria diemenensis, Quoy and Gaim.—Barren Island.
Mactra pura, Desh.—Forsyth Island. Numerous single valves on beach.
Mactra mathewsi, Tate.—Forsyth Island.
Mesodesma nitida, Desh.—Common in beach, a little below high tide, near settlement. A new record.

Semele exigua, A. Ad.—Common at settlement.
Solenotellina biradiata, Wood.—Barren Island.
Tellina decussata, Lamk.—Near settlement ; common and large.
Macoma mariæ, Ten.-Wds.—At settlement ; very plentiful and fine.
Chione scalarina, Lamk.—Barren Island.
Chione peronii, Lamk.—Lady Barron ; a new record.
Chione tristis, Lamk.—Barren Island.
Tapes galactites, Lamk.—Common as single valves at Forsyth Island.
Venerupis exotica, Lamk —Kangaroo Island.
Cardium cygnorum, Desh.—Barren Island.
Lucina tatei, Angas.—Common at settlement.
Lucina jacksonensis, Smith.—Common with last.
Lasæa scalaris, Phil.—Barren Island.
Mylitta tasmanica, Ten.-Wds.—Kangaroo Island.
Rochfortea donaciformis, Angas.—Forsyth Island.
Cardita rosulenta, Tate.—Barren Island.
Arca pistachia, Lamk.—Barren Island.
Glycimeris flammea, Reeve.—Forsyth Island ; a new record.
Glycimeris strictularis, Lamk.—Forsyth Island.
Glycimeris flabellatus, Ten.-Wds.—Barren Island.
Mytilus erosus, Lamk.—Very common on rocks and in mud-flats.
Modiola confusa, Angas.—Barren Island.
Modiola inconstans, Dunk.—Barren Island.
Modiolarca tasmanica, Beddome.—Forsyth Island.
Pteria papilionacea, Lamk.—Barren Island ; uncommon.
Vulsella vulsella, Linné.—Barren Island.

Bird Nomenclature.—Those who wish to know how our birds appear under trinomial names should look up the *Geelong Naturalist* for June (second series, vol. v., No. 3), where, in Mr. C. F. Belcher's "Notes on the Birds of the Torquay and Anglesea Districts," they will find many old friends so transformed as to be hardly recognizable in their extended christenings. The vernacular names also in many cases are triple-worded.

The Microscopical Society of Victoria.—The May leaflet of this society indicates steady progress. A report of an excursion by Mr. J. Stickland shows that the members need not travel far to secure novelties, as on 26th April a visit was paid to the various ponds or lakes of the Exhibition (Carlton) Gardens, when a fine collection of Protozoans, Crustaceans, and Rotifers was secured. Among the specimens collected was a Copepod which does not appear to have been described yet, and other forms which it was thought would prove to be new.

The Victorian Naturalist.

Vol. XXX.—No. 4. AUGUST 7, 1913. No. 356

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 14th July, 1913.

Mr. J. A. Kershaw, F.E.S., one of the vice-presidents, occupied the chair, and about 50 members and visitors were present.

REPORTS.

A report of the excursion to Monegatta North on Saturday, 12th July, was given by Mr. F. G. A. Barnard, who said that the Club was poorly represented on the joint excursion with the University students under Professor E. W. Skeats, D.Sc., for which perhaps the early start necessary was to some extent responsible. The day turned out all that could be desired. A north-easterly direction was taken towards Brock's Hill and the valley of the Deep Creek, or Saltwater River, where on the edge of the stream an exposure of diabase of Heathcotian age was examined. Further up stream an exposure of Ordovician shales was seen in contact with the diabase. During the ascent of a neighbouring hill a piece of shale showing remains of sponge spicules was picked up, which the leader was pleased to record as evidence of the age of the formation. From the top of the hill, in the midst of a huge meander of the stream, the geology and physiography of the district were fully demonstrated. An igneous dyke was next visited, and then at another bend of the river a fine Silurian section was explained, from whence a return was made to the station, the outing having covered some eight or nine miles. The botany of the district was not striking. Some large sheoaks, *Casuarina quadrivalvis*, were seen, and near the first halting place the rare fern *Grammitis leptophylla* was found, and close by a stunted form of the Sickle Fern, *Pteris falcata*. Three other ferns often associated with rocks—viz., *Grammitis rutæfolia*, *Cheilanthes tenuifolia*, and *Asplenium flabellifolium*—were afterwards met with.

A report of the junior excursion to Maribyrnong Bridge on Saturday, 5th July, was given by Mr. A. L. Scott, who said that, in the unavoidable absence of the leader, Mr. A. James, he had been asked to lead the excursion. The weather was dull, and rain had made roads in the district very sticky, possibly accounting for the rather small attendance. Quarry Hill was first visited, where the origin of the basalt, and its weathering, were discussed, while the difference between the past and present courses of

the Maribyrnong, formerly known as the Saltwater River, was pointed out. The old tower across the river was then visited, and the physiography of the district explained from that vantage point.

PAPERS READ.

1. By Mr. H. B. Williamson, entitled "Botanical Notes of a Trip to Mildura."

The author gave an account of a visit to Mildura, the well-known irrigation settlement, in north-western Victoria, early in September, 1912, and, while mentioning the many interesting features of that famous fruit-growing district, dwelt at some length on the indigenous flora met with, which yielded a number of interesting species. He had the pleasure of adding two additional species to the list of Victorian plants—viz., *Zygophyllum ovatum* and *Bassia lanicuspis*. One of the sights of the trip was the extensive patches of the small Crucifer, *Blennodia lasiocarpa*, which, being in full bloom, gave the ground the appearance of having been covered by a fall of snow. The paper was illustrated with a series of lantern slides.

Professor A. J. Ewart, D.Sc., said the Club was indebted to the author for his interesting paper. It was a very good instance of the work that could be done in the field, in collecting information which would be of value for future reference and adding definite scientific facts to our knowledge of the flora. As to *Zygophyllum ovatum*, it was rather strange that this Victorian plant should have been first described from material collected in Western Australia. In *Bassia lanicuspis* an additional species had been added to the Victorian flora, although specimens had been previously recorded for this State as a doubtful variety of *B. diacantha*. It was found, however, that they could be better placed under *B. lanicuspis* without any varietal rank.

Mr. J. Gabriel, whilst congratulating the author on his interesting and instructive paper, drew attention to the increasing disappearance of such a useful tree as the Murray Pine in the Riverina and adjoining districts.

Mr. J. A. Kershaw said the Murray Pine was largely used for fencing in the neighbourhood of Gunbower.

Mr. J. H. Harvey also remarked on the increasing demand for Murray Pine timber.

2. By A. D. Hardy, F.L.S., entitled "In the Mallee: Ouyen to Pinnaroo—Botanical Notes."

The author, owing to the lateness of the hour, confined his remarks to the explanation of the lantern slides, consisting of a fine series prepared fom photogaphs taken by Mr. A. S. Kenyon, C.E., Mr. D. Crosbie, and himself, those of

the Pink Lakes creating much interest. His notes were made during an official journey through the Mallee in October, 1910, in which Mr. Kenyon, on behalf of the Water Supply and Agricultural Departments, sought new fields for settlement (to be preceded by boring operations), while he collected botanical information for the State Forest Department. The journey of over one hundred miles in buggy and on horseback was described, and many notes on the trees and more conspicuous shrubs given, the journey being too rapid to allow of attention being devoted to the less noticeable plants. Generally speaking, there lies to the north of the newly-constructed Ouyen to Murrayville railway an inhospitable tract of country, reaching up to within about twenty miles of the Murray River, the country around Pink Lakes and Mount Gnar being about the limit of the cultivable belt through which the railway now runs. Settlement further north is checked on account of the water supply difficulty. Mr. Kenyon had tapped water near the foot of Mount Gnar, but failed elsewhere northerly, though the bore had been put down over 100 feet.

Mr. Hardy exhibited a plan of the Mallee country, on which he pointed out the different routes taken by members of the club since 1887, in all of which the Mallee had been entered from the south. These visits had been made by Messrs. C French, sen., D. Le Souëf, C. French, jun., C. Walter, D. Best, A. G. Campbell, J. C. Goudie, A. H. E. Mattingley, and Dr. C. S. Sutton, and their papers, scattered through the volumes of the *Victorian Naturalist*, taken together, formed a splendid record of a most interesting portion of the State.

The chairman said that members were indebted to the author for the very interesting description of Mallee vegetation, which was enhanced by the fine series of pictures shown, and remarked that, though animal life was reported scarce, the Mallee contained many species of birds, reptiles, and insects, some of them rare or peculiar to that portion of Victoria.

NATURAL HISTORY NOTE.

Mr. F. Chapman, A.L.S., called attention to his exhibit of a fruiting branch of the Japanese Cedar, *Cryptomeria Japonica*, which served as an illustration of the interesting relationship of the Cypresses, along with some true Araucarias, to various leafy branches and cones found in the Jurassic coal-measures of Jumbunna and Wonthaggi, in South Gippsland. A fossil representative of the genus Cryptomeria is represented by the *C. Sternbergi*, Gardner, of the Eocene beds of Antrim and the Island of Mull. Probably the Araucarias in their restricted sense embrace the larger part of our Jurassic conifers of South Gippsland, such

as *Brachyphyllum Gippslandicum* and *Palissya australis*. The spheroidal dehiscent cones of the exhibited specimen closely resemble the fossil genus known as Pagiophyllum, regarded, however, by palæobotanists as an Araucaria.

EXHIBITS.

By Mr. F. G. A. Barnard.—Geological specimens from Monegatta excursion; fine plant of fern, *Grammitis rutæfolia*, from gorge of No. 3 or Boyd's Creek, near Springfield.

By Mr. F. Chapman, A.L.S.—A fruiting branch of Japanese Cedar, *Cryptomeria Japonica*, grown at Balwyn.

By Mr. C. J. Gabriel.—Victorian oysters, *Ostrea angasi*, Sowerby, from Port Albert.

By Mr. W. Thorn.—Leaves of Blue Gum, *Eucalyptus globulus*, measuring two feet in length, from Beechworth.

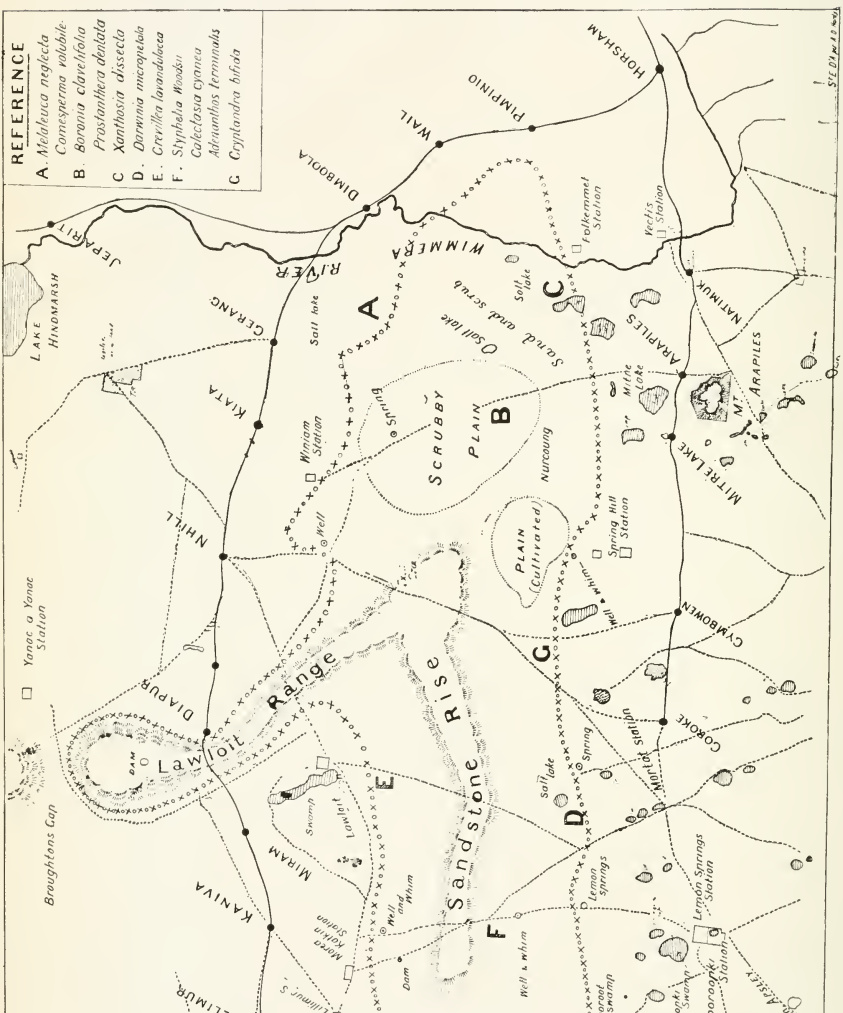
By Mr. J. R. Tovey.—Specimens of a hybrid orchid, collected at Mentone, July, 1913. This plant was first found (by the exhibitor) in July, 1907 (*Vict. Nat.*, September, 1907, vol. xxiv., p. 85), growing between *Pterostylis concinna*, R.Br., and *P. reflexa*, R.Br., var. *intermedia*, A. J. Ewart. Vegetatively it somewhat resembles the latter species, but the labellum is broader and faintly but distinctly bifid at its apex, in this respect approaching *P. concinna*. It appears now to be establishing itself, increasing in numbers and spreading.

After the usual conversazione the meeting terminated.

A Curious Nest of a Common Mouse.—By some means an interesting exhibit shown at the April meeting of the Club has escaped record. It was exhibited by Mr. J. A. Kershaw, F.E.S., on behalf of the National Museum, Melbourne, and consisted of the nest of a common mouse found in a salt store at Spencer-street, Melbourne. The nest was composed of pieces of bag, paper, &c., and was built in a large mass of pure salt, which had been removed from an adjacent bag and attached to the wall of the store. The round opening leading into the nest was made in the lower part of the mass of salt.

Common Names for Victorian Plants.—The Plant-Names Sub-Commitee has just held its fifty-first meeting, and completed the provisional naming of the Victorian flora. The task has been long, difficult, and tedious, but at the same time interesting and informative to those taking part in it. It is hoped that a further instalment will be published in an early number of the *Victorian Journal of Agriculture*. Meanwhile, Dr. Sutton's papers on the "Sandringham Flora," and Mr. St. E. D'Alton's on that of the "Little Desert" in the present issue, will help readers to become familiar with the suggested names as they stand at present.

PLATE IV.



Scale—12 miles to 1 inch. "LITTLE DESERT," WIMMERA, VICTORIA

THE BOTANY OF THE "LITTLE DESERT," WIMMERA, VICTORIA.

By St. Eloy D'Alton, C.E.

(*Read before the Field Naturalists' Club of Victoria, 14th April*, 1913.)

If the reader consults a map of Victoria, he will see marked thereon a long, narrow, irregular strip stretching from the South Australian Ninety-mile Desert to the River Wimmera, and terminating about a mile and a half east of that river, near Dimboola. This expanse of sand and scrub is called the "Little Desert," possibly to distinguish it from the Great Desert, which runs parallel with it some thirty miles further north. The average width of this strip is about fourteen miles, and the area consists nearly altogether of sand-hills alternating with sandy plains, strips of mallee, clay-pans, and here and there outcrops of sandstone, the whole being thickly clothed with a vast variety of scrub plants.

There are a large number of tracks crossing the desert from north to south, some still used occasionally, and others nearly obliterated by the encroaching scrub. The ravages of bush-fires from time to time account for some bare patches met with here and there, the blackened stems of the shrubs and mallee bushes being still left standing. There are some really pretty vistas to be met with in the Desert, particularly in the spring of the year, and the variety of tints in the foliage of the various trees and shrubs is quite remarkable, and not to be seen anywhere else in this part of Victoria, except in portions of the Great Desert.

There are no human habitations or areas under cultivation to be met with except along the extreme north and south margins. Here we find slight encroachments made by the husbandman, and here abounds a large number of fresh-water springs or soaks. In the early days the squatters sank a good many wells in the scrub to depths varying from 120 to 150 feet, and the explorer of these regions wonders when he comes across a dilapidated whim and a deep shaft in the most unlikely places. In those early days the squatters ran their sheep in the Little Desert, but only through the summer, to be taken out on to the open country during the winter. The increase of wild dogs and selectors and rabbits accounts for the change.

There is a spur of this desert, called the Lawloit Range, which nearly meets a corresponding spur of the northern desert, and is only separated by a comparatively narrow strip of good land, called Broughton's Gap. This spur is stony in places, outcrops of red sandstone occurring here and there. A little to the south of this spur, in the Little Desert, is a remarkable depression, on the summit of a low rise, resembling a crater.

It is quite circular, about three chains in diameter, and has precipitous sides of red sandstone, worn into fantastic shapes. This was discovered by a wild-dog trapper named Matthews, who described the situation of the crater to me, and, after spending two days in an unsuccessful attempt to find it, I at last made the discovery later on. There is a good-sized salt lake some distance away from the south margin of the desert, where good salt is obtained by a lessee who rents the lake from the Government; and a larger one exists still further south, in the parish of Duchembegara. Along the northern margin stood the squatters' stations of Winiam and Drumbanagher, now in the occupation of farmers, the Scrub Honeysuckle, *Banksia ornata*, growing almost up to their very doors. The southern margin was in the hands of the owners of Wyn-Wyn, Spring Hill, Spring Bank, Pleasant Banks, Mortat, Lemon Springs, and Tallageira stations, all of which, with the exception of Mortat, are now either in the hands of farmers or gone to ruin.

The plant-life around the margin of the Desert consists mostly of a wide belt of *Banksia ornata*, being a veritable paradise for the large number of honey-loving birds frequenting the place. The common *Casuarina distyla* fills up the spaces, and also *Leptospermum myrsinoides*. After passing through this belt we come to where a greater variety of plants abounds —for instance, *Zieria veronicea*, with its pretty pink flowers and balm-scented leaves; *Pultenæa tenuifolia*, *Styphelia virgata*, interspersed with tufts of *Lepidosperma carphoides*, and others of the cyperaceous order. We may also find specimens of *Calycothrix tetragona* and *Brachyloma daphnoides* here. The road from Nhill to Goroke passes through a part of the scrub abounding in a large number of plants, both common and uncommon. We have here, shortly after entering the desert, clumps of *Callistemon coccineus*, particularly showy when in flower, growing on the margin of a clay-pan or swamp, dry in summer and covered with a foot or two of water in the winter. If you pass along the road, say, in the month of November, you will probably be attracted by the bright blue flowers of the beautiful litle orchid *Thelymitra ixioides*, which pushes its blossoms about the level of the surrounding scrubs and grasses. We will also probably come across a dwarf variety of *Grevillea ilicifolia* (?) which creeps along the ground like *G. repens*, but has deeply cut leaves pungently pointed, greyish in colour, and small, insignificant flowers. Further on we come to a plain covered with a thick growth of dwarf shrubs, such as *Phyllota pleurandroides*, *Pultenæa tenuifolia*, and such like.

A complete change takes place when we reach the stony rise, and here we meet *Acacia Mitchelli*, *Acacia myrtifolia*,

Pseudanthus ovalifolius, *Isopogon ceratophyllus*, *Tetratheca ciliata* (sometimes with white flowers), *Lhotzkya genetylloides*, *Calycothrix tetragona*, *Eriostemon stenophyllus*, small trees of *Santalum persicarium* and *Callitris calcarata* not more than twelve feet high, *Brachyloma daphnoides*, a tall variety of *Pultenæa tenuifolia* of very bushy habit, the trailing *Eutaxia empetrifolia*, with some bushes of *Eucalyptus incrassata* (which is ubiquitous). *Styphelia adscendens*, *Styphelia humifusa*, and *Brachyloma ericoides* grow side by side, interspersed with the humbler *Helichrysum obtusifolium*, *H. scorpioides*, and *Haloragis tetragyna*, with here and there, in the sandier patches, that other showy representative of the order, *Loudonia Behri*. If we make diligent search just here we may be rewarded with a specimen of *Grevillea lavandulacea*, which takes the form of a good-sized shrub. *Grevillea Huegelii* is also to be found rather sparsely distributed. As we descend the hill we pass round the edge of a small salt lake, mostly dry, and here the late Mr. C. Walter and I collected the first specimen of *Darwinia micropetala*, a low shrub not more than nine inches high, with small whitish flowers, pronounced new for Victoria by the late Baron von Mueller. In the brackish water of the lake, before the summer sun dries it up, may be found *Ruppia maritima*. A few small trees of *Exocarpos spartea*, with its peculiar yellowish-green stems and branches, may be seen here, and on quitting the desert on southern margin a belt of *Leptospermum myrsinoides* is passed through, interspersed with *Casuarina distyla*. Near the little lake a small variety of *Boronia polygalifolia* may be met, with small, pale pink blossoms on trailing stems. Grasses, such as *Stipa crinita* (with both yellowish and purplish glumes) and *Stipa semibarbata*, are abundant in places, with a few plants of *Danthonia penicillata* in between.

On the road from Winiam to Mount Arapiles (shown on sketch map) may be found, in the spring of the year, the showy *Boronia clavellifolia* in profusion, its pink flowers making a brave show amongst its more sombre companions, and near the south margin of the desert there is a patch of *Styphelia strigosa* indicating a blow-up of ironstone and quartz, probably gold-bearing. About half-way through the desert we come to a large plain, many acres in extent, covered with low scrubs and surrounded with sand-hills, some covered with *Eucalyptus macrorhyncha*, or Stringy-bark, and others with *Melaleuca uncinata*, the latter preferring the gravelly rises, and with narrow belts and small clumps of *Eucalyptus incrassata* and *E. uncinata*. The lower scrubs are mostly *Styphelia virgata*, interspersed with *Phyllota pleurandroides*. Belts of *Epacris impressa*, pure white, will be met with at intervals, also a plant

or two of *Persoonia juniperina* and *Conospermum patens* standing well above the other scrub.

To the east of this road may be found a variety of *Prostanthera denticulata*, on gravelly soils, with very small leaves and good-sized purple flowers. My friend Dr. Sutton and I discovered this plant first amongst a bouquet of wild flowers which was exhibited at the Dimboola Agricultural and Pastoral Show a few years ago by children from near Polkemmet, close to the edge of the desert. We spent one whole Sunday, under the guidance of a boy on horseback trying to get some more specimens, and in succeeding nearly got bushed, as the "shades of night were falling fast" before we got out of the scrub. That little cosmopolitan of our State, *Gompholobium Huegelii* is to be found also in these low scrubs, and here and there *Euphrasia Brownii* puts forth its lilac and sometimes white flowers. We must not forget to mention that the neat little shrub *Logania linifolia* inhabits the south-east corner of the Desert in conjunction with *Styphelia ericoides*, one of the handsomest of the genus. The bright scarlet flowers of the *Prostanthera coccinea* will probably be noticed as you enter the stronger soil area in the same locality.

On a branch road near the southern extremity of the desert is a small hill covered mostly with *Leptospermum myrsinoides*, and on this rise there grow a few bushes of *Cryptandra bifida*. Specimens obtained by me some years ago and submitted to Baron von Mueller were identified as occurring elsewhere only on Kangaroo Island. This shrub grows to a height of about four feet, and is conspicuous by the white bracts around the flower-heads in comparison to the rusty colour of the foliage. Near this spot, in short scrub, *Xanthosia dissecta* may be found. *Lasiopetalum Baueri* is fairly common here, its rather pretty leaves and pinkish flowers making it easily discernible amongst its neighbours, such as *Hibbertia densiflora* and *H. stricta*, both common, particularly the latter.

Early in the spring or late in the winter the sand-hills will be found one mass of yellow, from the bloom of *H. virgata*. We must not forget the existence of such climbers as *Clematis microphylla* and *Comesperma volubile*—the former a very early bloomer and the latter extremely rare, because I have come across only one plant, in full bloom, and exhaling an exquisite odour, on the extreme northern edge of the Desert, supported by the new, recently found *Melaleuca neglecta*. I might state, *en passant*, that the said melaleuca was known to me many years ago, but the late Baron von Mueller confused it with *Melaleuca pustulata*, the paper-bark tree, which is also a denizen of the salt swamps of the Little Desert. The trees bloom at different periods, and the flowers have a different perfume,

that of *neglecta* being decidedly unpleasant. During the months of February and March the other species, *M. parviflora*, may be found in abundance in full bloom along the northern margin of the Desert. That other pretty species, *M. gibbosa*, inhabits most of the swamps met with here and there through the Desert, and in many places a dwarf variety of *pustulata* is to be met with, likewise *M. acuminata*. The common *Dodonæa viscosa* abounds in two forms—one with bright-coloured seed-vessels on low bushes, and the other tall shrubs or small trees having bright green leaves and pale seed-vessels. We must not forget the presence of *Bursaria spinosa*, in two forms likewise, one smaller than the other.

The road which leads from Kaniva to Lemon Springs or to Edenhope passes through a part of the Desert where that truly beautiful plant, *Calectasia cyanea*, abounds, also another pretty little shrub, a late bloomer, *Styphelia Woodsii*, of compact growth, and putting forth a profusion of small white, bell-like flowers, nicely perfumed. Here may also be found *Adenanthos terminalis*, a most peculiar-looking small shrub, brownish-green leaves and pale yellow flowers in heads, and now and then one sees a shrub or plant above the others, bright yellow or reddish, which, on closer inspection, turns out to be that other remarkable plant *Didymotheca pleiococca*, which grows abundantly here. If we travel this road in the month of October or November we will be surprised at the immense forest of grass-trees, *Xanthorrhœa australis*, passed through in full bloom, some of the spikes reaching to a height of at least ten feet. In the swamp grow *Limnanthemum exaltatum* and *Gratiola pedunculata*, margined with plants such as *Sebæa ovata* and *Erythræa spicata*; and probably the red colour one sees from a distance is due to the presence of *Myriophyllum elatinoides*. We may also have the pleasure of making the acquaintance of that rather handsome little shrub, *Thomasia petalocalyx*, pink-flowered and nicely adorned with crimpled leaves. We must not forget the presence in such places of the lowly little annuals, *Levenhookia dubia*, *Candollea calcarata*, and *Polypompholyx tenella*. On the rises occur *Amperea spartioides* in conjunction with *Styphelia serrulata*, and the *Casuarina distyla* is infested with the parasites *Cassytha glabella* and *C. pubescens*; and probably a mallee bush will be seen covered with the larger species, *C. melantha*. Rarely a plant of the handsome *Hybanthus floribundus* is found in the Little Desert, but the equally showy *Boronia cœrulescens* is generally seen peeping through the tussocks and smaller scrub.

There is a small oasis in the centre of the Desert on which grow a few Red Gum trees, *Eucalyptus rostrata*, and some *Leptospermum scoparium* bushes, under which may be found

a carpet of *Hibbertia fasciculata*. In one of the gum-trees a Wedge-tailed Eagle had constructed its nest, and for several years in succession brought out its brood unmolested. The presence of a large number of rabbit skins and bones under the tree bore witness to what the bird usually fed its young on. The bright blue flowers of *Brunonia australis*, mingled with the white of the *Burchardia umbellata*, will meet the eye during the spring in this oasis, likewise *Goodenia geniculata* and *G. pinnatifida*. The more shrubby *G. amplexans* and *G. varia* are rare, or altogether wanting, in this region. Here, also, may be found a few orchids, such as *Diuris maculata*, *Prasophyllum fuscum*, *Caladenia carnea*, and *C. dilformis*. Specimens of *Stackhousia linarifolia* and *Stemodia Morgania*, with both white and blue flowers, may also be found here. The pretty climber, *Billardiera cymosa*, is not uncommon, but it favours some localities more than others.

In a remote part of the Desert, a little way from the main portion, there is a pale-flowered *Dipodium punctatum* to be found, and on many of the hard, gravelly rises, as well as on the good soils around the margin of the desert, that showy member of the Melaleuca family, *M. Wilsonii*, abounds, its crimson blossoms adorning the dark green of the foliage in the months of October and November.

In most parts of the Desert may be found *Comesperma calymega* and *C. scoparium*—the one with dark blue and the other with pink flowers. *Lobelia simplicicaulis* is also rather thinly dispersed. The Compositæ is largely represented by *Helichrysum Baxteri*, *H. scorpioides*, *H. obtusifolium*, *H. leucopsidium*, *H. Blandowskianum*, *H. apiculatum*, *H. semipapposum*, *H. decurrens*, *H. obcordatum*, *Brachycome pachyptera*, *B. collina*, *B. melanocarpa*, *Aster Huegelii*, *Vittadinia australis*, *Podotheca angustifolia*, *Ixiolæna tomentosa*, *Leptorrhynchos squamatus*, *L. Waitzia*, *Helipterum exiguum*, *H. dimorpholepis*, *Humea squamata*, *Millotia tenuifolia*, *Toxanthus Muelleri*, *Gnaphalodes uliginosa*, *Craspedia Richea*, *Centipeda Cunninghami*, *Senecio brachyglossus*, *S. magnificus*, *Cymbonotus Lawsonianus*, and *Microseris Forsteri*. Round some of the salt lakes *Samolus repens*, *Frankenia lævis*, and *Mimulus repens*, intermixed with *Wilsonia rotundifolia*, are not uncommon. *Ranunculus lappaceus* may be found growing on the more clayey soils. The Crucifers are not numerous, being represented by *Alyssum minimum*, *Lepidium ruderale*, and *Sisymbrium cardaminioides*.

In some of the damp, sandy flats, *Drosera Whittakeri* and *D. spathulata* are abundant, and in many places *D. Menziesii* will be found twining amongst the bushes. A small form of *Hypericum Japonicum* is prevalent in moist places, and in some

few spots, particularly along the northern margin, some nice bushes of *Eriostemon pungens* may be found in conjunction with its more showy neighbour, *Eremophila gibbosifolia*. The common *Correa speciosa* abounds everywhere—flowers red, with whitish tips to petals, and roundish, crumpled leaves. *Pelargonium Rodneyanum* is rather rare, but may be found along the southern margin. *Oxalis corniculata* abounds in the better class of soils, and *Poranthera microphylla*, with its relatives, *Beyeria viscosa* and *Amperea spartioides*, abound in certain parts of the Desert. *Claytonia australasica* is to be found growing in many of the springs, and *C. calyptrata* is fond of the shade of trees in sandy ground. *Scleranthus pungens* is not rare on sandy flats, and *Rhagodia nutans* may be found along the margins of the Desert, twining through the scrub. *Chenopodium carinatum*, with its unpleasant smell, has found its way into some parts, but is not very common. *Suæda maritima* is not uncommon in the salt lakes, and *Mesembryanthemum australe* is likewise fond of the saline soils. *Muehlenbeckia Cunninghami* is fairly common around the fresh-water swamps in most parts of the Desert, and the Leguminosæ is, together with those plants already enumerated, represented by *Pultenæa largiflorens*, *P. densifolia*, *Dillwynia floribunda*, *D. patula*, *D. ericifolia*, *Platylobium obtusangulum*, *Swainsonia procumbens*, *Kennedya prostrata*, *Acacia spinescens*, *A. rigens*, *A. pycnantha*, *A. brachybotrya*, *A. trineura*, *A. sclerophylla*, and a very few *A. decurrens*. *Tillæa verticillaris* is frequent on spongy ground, and on the same sort of soil may be found *Thryptomene ciliata*, *Cryptandra leucophracta* and *C. subochreata*. On the sandy, springy ground the showy *Ajuga australis* is fairly abundant, and aquatic plants, such as *Ottelia ovalifolia* and *Vallisneria spiralis* grow in some of the tanks sunk by the squatters in the early days. In many places, amongst the high scrub, the blue blossoms of the *Dianella revoluta* make a show in the spring of the year, and *Bartlingia sessiliflora* makes its insignificant presence known. Along the river frontage, near what is called the "Burning Bog," grow large tufts of *Cladium articulatum*, or the "Jointed Rush," and a great variety of other semi-aquatic sedges, Cyperus, Heleocharis, Scirpus, Schœnus, and Carex. In the sand hummocks grow *Lepidosperma laterale*, *L. carphoides*, *Lepidobolus drapetocoleus*, and *Calostrophus fastigiatus*. With the exception of the Common Bracken, *Pteris aquilina*, which grows in some parts along the margin of the Desert, there are no ferns. A small creeping caryophyllaceous plant found by the writer near the "Burning Bog" was declared new for Victoria by Mr. Luehmann, and named *Arenaria axillaris* by him.

There grew at one time, on the south-west corner of the Disputed Territory, a solitary bush of a Hakea resembling *H. ulicina*, having crimson blossoms. On making a subsequent visit I found that a bush-fire had swept through the scrub some time before and had destroyed the beautiful shrub completely. This bush was noticed by several persons long before I saw it, particularly by the then Tallageira Station overseer, Mr. Cattanach, who directed me to it. The station in those days possessed a well-kept garden, full of flowers and fruit-trees. But on visiting it later on I found everything in a state of decay and dilapidation; the dwelling was untenanted.

I will now conclude this paper with a few remarks as to the best way to reach this region. The eastern end of the Desert is best explored from Dimboola, either on horseback or on foot. A vehicle could be used, but the travelling would be very heavy in places. The southern margin could be visited from Mortat Station, *viâ* Natimuk and Goroke railway, which starts from Horsham. I am sure that Mr. F. G. Robertson, the owner of the station, would be only too happy to provide a night's lodging, and a horse and trap to explore the neighbouring scrub, to any member of the Field Naturalists' Club who would feel disposed to pay a visit to the district. The northern part could be approached from Nhill, Lawloit, Kaniva, and Lillimur by making previous arrangements with residents of these places, who would, I am sure, be glad to pilot a party into the interior of the scrub.

I might add that the interior of the Desert is singularly devoid of bird-life; it is only around the margins where there is any variety, and therefore members who take an interest in such life would probably be disappointed with a visit to the Little Desert.

In view of the interest attaching to the great variety of plants to be met with in the Little Desert, it has been thought desirable to make a complete census of all the plants I have noted in the district. This has been done by my friend, Dr. C. S. Sutton, who has also added the vernacular names as proposed by the Plant Names Committee, and the more important alterations in generic and specific names which are intended to be adopted in the next census of Victorian plants.

Dilleniaceæ—

Hibbertia densiflora, F. v. M.—Silky Guinea-flower.
,, stricta, R. Br.—Erect Guinea-flower.
,, fasciculata, R. Br.—Bundled Guinea-flower.
,, virgata, R. Br.—Twiggy Guinea-flower.

Ranunculaceæ—

Ranunculus lappaceus, Sm.—Common Buttercup.
Clematis microphylla, D. C.—Smaller Clematis.

Lauraceæ—
Cassytha glabella, R. Br.—Tangled Dodder-laurel.
,, pubescens, R. Br.—Downy Dodder-laurel.
,, melantha, R. Br.—Large Dodder-laurel.

Cruciferæ—
Blennodia cardaminoides, F. v. M. (Sisymbrium cardaminoides, F. v. M.)—Sand Blennodia.
Alyssum minimum, Pallas—Desert Alyssum.
Lepidium ruderale, L.—Rubble Pepper-cress.

Violaceæ—
Hybanthus floribundus, F. v. M.—Shrub Violet.

Pittosporaceæ—
Bursaria spinosa, Cav.—Sweet Bursaria.
Billardiera cymosa, F. v. M.—Sweet Apple-berry.

Droseraceæ—
Drosera spathulata, Lab.—Spoon-leaved Sundew.
,, Whittakeri, Planchon—Scented Sundew.
,, Menziesii, R. Br.—Climbing Sundew.

Guttiferæ (Hypericineæ)—
Hypericum Japonicum, Thunb.—Small St. John's-wort.

Polygalaceæ—
Comesperma scoparium, Steetz—Broom Milkwort.
,, volubile, Lab.—Love-creeper.
,, calymega, Lab.—Blue-spiked Milkwort.

Tremandraceæ—
Tetratheca ciliata, Lindl.—Variable Pinkeyes.

Rutaceæ—
Zieria veronicea, F. v. M.—Pink Zieria.
Boronia cœrulescens, F. v. M.—Bluish Boronia.
,, polygalifolia, Sm.—Waxy Boronia.
,, clavellifolia, F. v. M.—Desert Boronia.
Phebalium pungens, Benth. (Eriostemon pungens, Lindl.)—Prickly Phebalium.
,, stenophyllum, F. v. M. (Eriostemon stenophyllus, F. v. M.)—Narrow-leaved Phebalium.
Correa speciosa, Andr.—Common Correa.

Geraniaceæ—
Geranium dissectum, L. (G. Carolinianum, L., and G. pilosum, Sol.)—Cut-leaved Geranium.
Pelargonium Rodneyanum, Mitchell—Rosy Pelargonium.
Oxalis corniculata, L.—Yellow Wood-sorrel.

Sterculiaceæ—
Thomasia petalocalyx, F. v. M.—Paper-flower.
Lasiopetalum Baueri, Steetz—White Velvet-bush.

Euphorbiaceæ—
Poranthera microphylla, Brong.—Small-leaved Poranthera.
Pseudanthus ovalifolius, F. v. M.—Oval-leaved Pseudanthus.
Beyeria viscosa, Miq.—Sticky Wallaby-bush.
Amperea spartioides, Brong.—Broom Spurge.

Casuarinaceæ—
Casuarina distyla, Vent.—Stunted Sheoak.
,, Luehmanni, R. T. B.—Bulloak.

Sapindaceæ—
Dodonæa viscosa, L.—Giant Hop-bush.

Stackhousiaceæ—
Stackhousia linarifolia, Cunn.—Creamy Stackhousia.

Frankeniaceæ—
Frankenia pauciflora, D. C. (F. lævis, L.)—Sea-heath.

Portulaceæ—
Calandrinia calyptrata, Hook. fils (Claytonia calyptrata, F. v. M.) —Pink Purslane.
Claytonia australasica, Hook. fils—White Purslane.
Caryophyllaceæ—
Scleranthus pungens, R. Br.—Prickly Knawel.
Chenopodiaceæ—
Rhagodia nutans, R. Br.—Nodding Salt-bush.
Chenopodium carinatum, R. Br.—Keeled Goosefoot.
Suæda maritima, Dumort.—Seablite.
Mesembryaceæ (Ficoideæ)—
Mesembryanthemum australe, Sol.—Rounded Pigface.
Polygonaceæ—
Muehlenbeckia Cunninghami, F. v. M.—Tangled Lignum.
Phytolaccaceæ—
Gyrostemon cyclotheca, Benth. (Didymotheca pleiococca, F. v. M.) —Wheelfruit.
Thymeleaceæ—
Pimelea octophylla, R. Br.—Downy Rice-flower.
Papilionaceæ—
Gompholobium Huegelii, Benth.—Lemon Wedge-pea.
Daviesia brevifolia, Lindl.—Leafless Bitter-pea.
Phyllota pleurandroides, F. v. M.—Phyllota.
Pultenæa laxiflora, Benth.—Spreading Bush-pea.
,, largiflorens, F. v. M.—Twiggy Bush-pea.
,, densifolia, F. v. M.—Dense Bush-pea.
,, tenuifolia, R. Br.—Slender Bush-pea.
Eutaxia empetrifolia, Schlecht.—Eutaxia.
Dillwynia ericifolia, Smith—Heathy Parrot-pea.
,, floribunda, Sm.—Crowded Parrot-pea.
,, patula, F. v. M.—Spreading Parrot-pea.
Platylobium obtusangulum, Hook.—Burrumbeet Flat-pea.
Swainsona procumbens, F. v. M.—Large-flowered Swainsona.
Kennedya prostrata, R. Br.—Running Postman.
Mimosaceæ—
Acacia spinescens, Benth.—Spiny Acacia.
,, rigens, Cunn.—Wallaby Wattle or Nealie.
,, pycnantha, Benth.—Golden Wattle.
,, brachybotrya, Benth.—Silvery Acacia.
,, myrtifolia, Willd.—Myrtle-leaved Acacia.
,, trineura, F. v. M.—Trinerved Acacia.
,, sclerophylla, Lindl.—Hard-leaved Acacia.
,, Mitchelli, Benth.—Fringe Wattle.
,, decurrens, Willd.—Early Black Wattle.
Crassulaceæ—
Crassula Sieberiana, Schult. (Tillæa verticillaris, D. C.)—Austral Stonecrop.
Halorrhagidaceæ—
Loudonia Behrii, Schlecht.—Golden Pennants.
Haloragis tetragyna, Hook. fils—Poverty Raspwort.
Myriophyllum elatinoides, Gaud.—Coarse Milfoil.
Myrtaceæ—
Darwinia micropetala, Benth.—Small Scent-myrtle.
Calytrix (Calycothrix) tetragona, Lab.—Common Fringe-myrtle.
Lhotzkya genetylloides, F. v. M.—Snowy Myrtle.
Micromyrtus microphylla, Benth. (Thryptomene ciliata, F. v. M.) —Fringed Heath-myrtle.
Leptospermum scoparium, R. and G. Foster.—Manuka.
,, myrsinoides, Schlecht.—Myrrh Tea-tree.

Myrtaceæ—

Callistemon coccineus, F. v. M.—Scarlet Bottlebrush.
Melaleuca acuminata, F. v. M.—Snowy Honey-myrtle.
,, gibbosa, Lab.—Slender Honey-myrtle.
,, Wilsonii, F. v. M.—Purple Honey-myrtle.
,, parviflora, Lindl.—Moonah Honey-myrtle.
,, uncinata, R. Br.—Broom Honey-myrtle.
,, pustulata, J. Hooker—Blistered Honey-myrtle.
,, neglecta, Ewart and White.
Eucalyptus macrorrhyncha, F. v. M.—Red Stringybark.
,, uncinata, Turcz.—Hooked Mallee.
,, incrassata, Lab.—Giant Mallee.
,, rostrata, Schlecht.—River Red Gum.

Rhamnaceæ—

Cryptandra leucophracta, Schlecht.—White Cryptandra.
Spyridium bifidum, F. v. M. (C. bifida, F. v. M.) — Forked Spyridium.
,, subochreatum, Reiss (C. subochreata, F. v. M.)—Velvet Spyridium.
,, vexilliferum, Hook.—Wing Spyridium.

Umbelliferæ—

Xanthosia dissecta, Hook. f.—Cut-leaved Xanthosia.

Santalaceæ—

Exocarpus spartea, R. Br.—Broom Ballart.
Fusanus persicarius, F. v. M. (Santalum persicarium, F. v. M.)—Ming Quandong.

Proteaceæ—

Isopogon ceratophyllus, R. Br.—Horny Cone-bush.
Adenanthos terminalis, R. Br.—Hair-bush.
Conospermum patens, Schlecht.—Slender Conosperm.
Persoonia juniperina, Lab.—Prickly Geebung.
Grevillea lavandulacea, Schlecht.—Lavender Grevillea.
,, Huegelii, Meissn.—Comb Grevillea.
Hakea ulicina, R. Br.—Furze Hakea.
,, rostrata, F. v. M.—Beaked Hakea.
Banksia marginata, Cav.—Silver Banksia.
,, ornata, F. v. M.—Desert Banksia.

Compositæ—

Brachycome exilis, Sonder—Slender Daisy.
,, melanocarpa, Sonder and F. v. M.—Black-fruited Daisy.
,, pachyptera, Turcz.—Black-fruited Daisy.
,, collina, Benth.—Hill Daisy.
Olearia ciliata, F. v. M. (Aster Huegelii, F. v. M.)—Blue Aster.
Vittadinia australis, A. Rich.—New Holland Daisy.
Podotheca angustifolia, Lab.—Narrow-leaved Podotheca.
Ixiolæna tomentosa, Sond. and F. v. M.—Woolly Ixiolæna.
Leptorrhynchus squamatus, Less.—Scaly Buttons.
,, Waitzia, Sond.—Immortelle Buttons.
Helipterum exiguum, F. v. M.—Tiny Sunray.
,, dimorpholepis, Benth.—Common Sunray.
Helichrysum Baxteri, Cunn.—White Everlasting.
,, scorpioides, Lab.—Curling Everlasting.
,, obtusifolium, Sond. and F. v. M. — Blunt Everlasting.
,, leucopsidium, D. C.—Satin Everlasting.
,, Blandowskianum, Steetz—Woolly Everlasting.
,, apiculatum, D. C.—Pointed Everlasting.
,, semipapposum, D. C.—Downy Everlasting.

COMPOSITÆ—
Helichrysum adnatum, Benth. (incl. H. decurrens, F. v. M.)—Rough Everlasting.
,, obcordatum, F. v. M.—Grey Everlasting.
Humea squamata, F. v. M.—Scaly Humea.
Millotia tenuifolia, Cass.—Soft Millotia.
Toxanthus Muelleri, Benth.—Larger Bow-flower.
Gnaphalodes uliginosa, A. Gray.—Flannel Sandweed.
Craspedia Richea, Cass.—Big Billy-buttons.
Centipeda Cunninghami, F. v. M.—Erect Sneezeweed.
Senecio magnificus, F. v. M —Showy Senecio.
,, brachyglossus, F. v. M.—Slender Senecio.
Cymbonotus Lawsonianus, Gaud.—Large-leaved Daisy.
Microseris Forsteri, Hook. f.—Murrnong Yam.

CAMPANULACEÆ—
Lobelia gibbosa, Lab. (L. simplicicaulis, R. Br.)—Tall Lobelia.
Isotoma fluviatilis, F. v. M.—Swamp Isotoma.
Wahlenbergia gracilis, D. C.—Austral Bluebell.

STYLIDACEÆ—
Stylidium graminifolium, Swartz (Candollea serrulata, Lab.)—Grass Trigger-plant.
,, calcaratum, R. Br. (Candollea calcarata, F. v. M.)—Bristly Trigger-plant.
Levenhookia dubia, Sonder—Hairy Stylewort.

BRUNONIACEÆ—
Brunonia australis, Smith—Blue Pincushion.

GOODENIACEÆ—
Dampiera stricta, R. Br.—Blue Dampiera.
Goodenia varia, R. Br.—Sticky Goodenia.
,, amplexans, F. v. M.—Clasping Goodenia.
,, geniculata, R. Br.—Bent Goodenia.
,, pinnatifida, Schlecht.—Cut-leaved Goodenia.

GENTIANACEÆ—
Villarsia reniformis, R. Br. (Limnanthemum exaltatum, F. v. M.)—Yellow Marsh-flower.
Sebæa ovata, R. Br.—Yellow Sebæa.
Erythræa australis, R. Br.—Austral Centaury.

LOGANIACEÆ—
Mitrasacme paradoxa, R. Br.—Curious Mitrewort.
Logania linifolia, Schlecht.—Flax-leaved Logania.

PRIMULACEÆ—
Samolus repens, Pers.—Creeping Brookweed.

CONVOLVULACEÆ—
Wilsonia rotundifolia, Hook.—Round-leaved Wilsonia.

SCROPHULARIACEÆ—
Mimulus repens, R. Br.—Creeping Monkey-flower.
Morgania floribunda, Benth. (Stemodia Morgania, F. v. M.)—Blue Rod.
Gratiola pedunculata, R. Br.—Stalked Gratiola.
Euphrasia collina, R. Br. (E. Brownii, F. v. M.)—Purple Eye-bright.
Veronica peregrina, L.—Wandering Speedwell.

LENTIBULARIACEÆ—
Polypompholyx tenella, Lehm.—Tender Bubble-plant.

LABIATÆ—
Prostanthera denticulata, R. Br.—Rough Mint-bush.
,, coccinea, F. v. M.—Scarlet Mint-bush.
Ajuga australis, R. Br.—Bugle.

Myoporaceæ—
Pholidia (Eremophila) gibbosifolia, F. v. M.—Scaly Emu-bush.
Epacridaceæ—
Styphelia adscendens, R. Br.—Golden Heath.
Astroloma humifusum, R. Br. (Styphelia humifusa, Persoon)—Cranberry Heath.
Lissanthe strigosa, R. Br. (Styphelia strigosa, Smith)—Peach Heath.
Leucopogon costatus, F. v. M. (Styphelia costata, F. v. M.)—Ribbed Beard-heath.
,, virgatus, R. Br. (Styphelia virgata, Lab.)—Twiggy Beard-heath.
,, ericoides, R. Br. (Styphelia ericoides, Smith)—Pink Beard-heath.
,, rufus, Lindl. (Styphelia rufa, F. v. M.)—Ruddy Beard-heath.
,, Woodsii, F. v. M. (Styphelia Woodsii, F. v. M.)
Acrotriche serrulata, Lab. (Styphelia serrulata, Lab.)—Honey Goggles.
Brachyloma daphnoides, Benth.—Daphne Heath.
,, ericoides, Sonder.—Broom Heath.
Epacris impressa, Lab.—Common Heath.
Orchidaceæ—
Dipodium punctatum, R. Br.—Spotted Orchid.
Thelymitra ixioides, Swartz—Dotted Hood-orchid.
Diuris maculata, Sm.—Leopard Orchid.
Prasophyllum fuscum, R. Br.—Tawny Leek-orchid.
Caladenia Patersoni, R. Br.—Spider Orchid.
,, carnea, R. Br.—Pink Fingers.
Amaryllidaceæ—
Hypoxis glabella, Lab.—Yellow Star.
Hydrocharidaceæ—
Ottelia ovalifolia, L. C. Rich.—Ottelia.
Vallisneria spiralis, L.—Vallisneria.
Liliaceæ—
Dianella revoluta, R. Br.—Spreading Flax-lily.
Burchardia umbellata, R. Br.—Milkmaids.
Bartlingia sessiliflora, F. v. M.—Nodding Silverweed-lily.
Calectasia cyanea, R. Br.—Blue Tinsel-lily.
Xerotes leucocephala, R. Br.—White Mat-rush.
Xanthorrhœa australis, R. Br.—Big Grass-tree or Blackboy.
Naiadaceæ—
Ruppia maritima, L.—Sea-tassel.
Triglochin mucronata, R. Br.—Prickly Arrow-grass.
Centrolepidaceæ—
Centrolepis polygyna, Heiron—Mossy Centrolepis.
,, aristata, R. & S.—Pointed Centrolepis.
,, strigosa, R. & S.—Hairy Centrolepis.
Restiaceæ—
Hypolæna fastigiata, L. Br. (Calostrophus fastigiatus, F. v. M.)—Faded Rope-rush.
Lepidobolus drapetocoleus, F. v. M.—Eastern Chaff-rush.
Cyperaceæ—
Cyperus rotundus, L.—Nut Sedge.
,, vaginatus, R. Br.—Sheath Leaf-rush.
Heleocharis acuta, R. Br.—Common Spike-rush.
Scirpus cartilagineus, Spreng.—Gristle Club-rush.
Schœnus apogon, R. & S.—Fluke Bog-rush.
Lepidosperma laterale, R. Br.—Broad Sword-sedge.

Cyperaceæ—
Lepidosperma carphoides, F. v. M.—Bundle-flowered Sword-sedge.
Cladium articulatum, R. Br.—Jointed Twig-rush.
Gahnia radula, Benth.—Black Saw-sedge.
Carex paniculata, L.—Panicle Sedge.

Gramineæ—
Stipa semibarbata, R. Br.—Fibrous Spear-grass.
Dichelachne crinita, Hook. f.—Long-hair Plume-grass.
Danthonia penicillata, F. v. M.—Wallaby-grass.
Triodia irritans, R. Br.—Porcupine-grass or False Spinifex.

Coniferæ—
Callitris calcarata, R. Br.—(?) Marong.

Filices—
Pteris aquilina, L.—Bracken.
Cheilanthes tenuifolia, Swartz—Common Rock-fern.

The Military Tactics of Ants.—The following incident, which recently came under my notice, adds another to the many instances that have been recorded of the fact that ants at times exercise a degree of intelligence nearly akin to reason. Being out hunting the nimble bunny, and having shot one, I placed the body near the nest of a thriving colony of small black ants, with the view of ascertaining if the occupants were of a carnivorous nature. They at once swarmed over the rabbit; but, soon realizing that the object of their attack was harmless, left it and returned to the task of enlarging their nest. Presently some scouting members of the meat-ant tribe, *Leptomyrmex detectus*, discovered the rabbit, and, after taking a sample, as is their wont, hurried away post haste with the news of the booty to their own headquarters, some 40 feet distant. In a few minutes half a hundred meat-ants were on the scene, and as they scampered about some of them came in contact with the little black ones. The latter seemed instantly to divine an impending attack. Pouring from the nest in hundreds, they flung themselves with great fury on the invaders, and a battle royal took place. A strong body of the small ants, however, had remained at the nest without taking part in the fray, and these were now seen to be working with desperate energy to close up the entrance to the nest. While some pulled a few bits of straw or grass-seeds into the doorway, the rest carried back the earth that had been excavated, piling it up with incredible rapidity, so that in a few moments no trace remained of the entrance. That done, the word to retreat must have been passed, and the whole colony, including the fighting rear-guard, retired in a solid phalanx to another nest of the same species situated some yards away. To further test the matter, I lifted the rabbit, now covered with meat-ants, and put it near this second nest, with precisely the same result. The cause of all the trouble was then removed, and a few hours later the small ants had returned and taken full possession of

their domiciles. Such plain evidence of a preconcerted plan of action in the event of attack would seem to indicate that predatory raids by one species of ant on the nests of others are of common occurrence.—J. C. Goudie. Sea Lake, 25/1/13. [This note has been held over for several issues, owing to want of space.—Ed. *Vict. Nat.*]

The Freshwater Crayfishes of Australia. — A useful memoir by Mr. Geoffrey Smith, M.A., on the freshwater crayfishes of Australia is published in the *Proceedings of the Zoological Society of London*, 1912. Mr. Smith, who, it will be remembered, visited Australia and Tasmania in 1907–8, and wrote an interesting volume on his trip, entitled "A Naturalist in Tasmania," divides the group into three genera, embracing eight species. He considers *Astacopsis* (*Astacoides*) *serratus*, the Murray River Crayfish, includes the various forms found in the streams of Northern Victoria, the Yarra, and the Parramatta, but gives the name *A. kershawi* to a species found by Mr. J. A. Kershaw, F.E.S., in the Moe River, which he considers a connecting link with the Tasmanian species, *A. franklinii*. A new genus, Parachæraps, is founded for the common Yabber, or Yabbie, named *Astacoides bicarinatus* by M'Coy. The genus Chæraps includes four species from Western and Northern Australia, one species extending to New Guinea and the Aru Islands. The memoir is illustrated with beautifully executed plates.

The Land Crayfishes of Australia. — In a memoir published by the Zoological Society of London in March last, Mr. Geoffrey Smith, M.A., and Mr. E. H. J. Schuster, M.A., D.Sc., deal with the crustaceans belonging to the genus Engæus, popularly known as "land-crabs." The authors recognize seven species, all found either in Victoria or Tasmania, or in both. Erichson, in 1846, described *Engæus fossor*, the type of the genus, which, it seems, is confined to Tasmania, but his second species, *E. cunicularius*, occurs both in Tasmania and Victoria: the remaining five species are all Victorian, and are regarded by the authors as new to science. Judging by the localities given, *E. victoriensis* is the name of our commonest species, being recorded from Box Hill, Ferntree Gully, Emerald, and Gippsland; *E. affinis* occurs in the Upper Yarra district; *E. phyllocercus* is confined to Gippsland: *E. hemicirratulus*, named in MS. by Prof. M'Coy as *Hemicirratulus hystrix*, is recorded from South Gippsland: while *E. fultoni*, named in honour of Mr. S. W. Fulton, a former member of the Club, who devoted considerable attention to this group, is recorded from Ferntree Gully and the Otway Forest. The memoir is well illustrated by figures of the types and dissections.

"The Austral Avian Record."—Since our last notice two parts of this publication have come to hand. A double number, 6 and 7 (February, 1913), is devoted to "A List of the Species of Australian Birds Described by John Gould, with the Location of the Type Specimens," by Dr. Witmer Stone, in conjunction with Gregory M. Mathews. The list contains 1,444 species or varieties, of which there are 1,858 specimens. These, it will be remembered, were purchased for America in 1847, and are now in the possession of the Academy of Natural Sciences, Philadelphia. A few types described after that date are in the British Museum. The list is a very useful bit of work for Australian ornithologists. The eighth number (March, 1913), completing vol. i., contains a long series of additions and corrections to Mr. Mathews' "Reference-list," which are mostly trinomials. Another article confers ten new generic names on our birds. One is the much-talked-of name "Myola," which is adopted for a genus of which the White-necked Heron, *Notophoyx pacifica*, is the type. A close analysis of the origin of the genus name Meliphaga completes the number.

The Wild-Flowers of New South Wales.—Under the title of "A Popular Guide to the Wild-Flowers of New South Wales," a useful handbook has recently been published by Angus and Robertson, of Sydney. It consists of a well-bound octavo volume (price 3s. 6d.) of 240 pages, and has the merit of being capitally illustrated with 51 full-page plates, in which the flowers are generally of natural size, and, having been drawn as copies for art students, are practically in outline, so that an enthusiast possessing a little practical knowledge of water-colours could easily make his copy an attractive volume. A useful introduction calls attention to the various points on which the descriptions of the plants are based. The work contains several novel features, one of which is an index to the species arranged as to the colours of their flowers, but space will not permit further details. Unfortunately, only a portion of the flora is dealt with, but we trust the authoress, Miss F. Sulman, will be encouraged by the success of this to publish another volume at no distant date.

"Nests and Eggs of Birds Found Breeding in Australia and Tasmania."—Two parts of this special catalogue, published by the trustees of the Australian Museum, Sydney, have recently been issued. As usual, they indicate painstaking work on the part of the author, Mr. A. J. North, C.M.Z.S., Ornithologist to the Museum, and contain a number of interesting illustrations. The parts under notice deal with the Ibis, Spoonbills, Bitterns, Ducks, Pigeons, Megapodes, Quail, &c.

The Victorian Naturalist.

Vol. XXX.—No. 5. SEPTEMBER 4, 1913. No. 357.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 14th August, 1913. Mr. J. A. Kershaw, F.E.S., one of the vice-presidents, occupied the chair, and about 50 members and visitors were present.

CORRESPONDENCE.

From Dr. J. A. Leach, D.Sc., resigning his position as president of the Club, on account of the pressure of official duties rendering it impossible for him to attend the meetings of the Club. The chairman said that from his letter it seemed clear that Dr. Leach could not attend the Club's meetings.

Mr. F. Wisewould said he failed to see that the Club could do anything else but accept the resignation. He therefore moved that the resignation be accepted with very great regret. Mr. G. Coghill, who seconded the motion, said he had had a conversation with Dr. Leach, who expressed himself as being compelled to resign the position of president, owing to the remoteness of the district to which his duties now carried him.

Mr. D. Best thought it advisable to allow the matter to stand over pending the conclusion of the president's term of office, and moved an amendment to that effect, which was seconded by Mr. J. Booth.

Dr. T. S. Hall said it was a delicate matter to speak upon, and considered when Dr. Leach found he could not fulfil the duties of the position, he took the proper course in tendering his resignation.

Professor A. J. Ewart, D.Sc., said the wisest plan for the Club would be to accept the resignation.

The amendment having been withdrawn, the motion was carried with expressions of regret.

REPORTS.

A report of the excursion to Frankston on Saturday, 9th August, was, in the absence of the leader, Dr. G. B. Pritchard, F.G.S., given by Mr. F. G. A. Barnard, who said that the showery morning had doubtless deterred some members from venturing so far, but the afternoon proved fine and very enjoyable. The Mornington road was followed to the site of the disused brick-works, where the relations between the Tertiary, Older Basalt, and Granitic formations were demon-

strated. A little further along the granite was found outcropping at sea-level, with a high cliff of decomposed granitic material close at hand. Then the basalt was found in a similar position and condition. Several accumulations of broken seashells were pointed to as sites of camping-places of the aboriginals in days gone by, where they had broken the shells in order to get at the animals for food. A visit was next paid to the vicinity of Landslip Point, and the reasons given for the great amount of earth-sliding which has taken place in the neighbourhood. A return was then made along the coast until it became too difficult, when the road was again taken in to Frankston. The many charming sea-scapes seen during the three-mile walk were not the least interesting part of the outing.

A report of the junior excursion to the National Museum, on Saturday, 2nd August, was given by Mr. J. A. Kershaw, F.E.S., who said the attendance was very disappointing—only three juniors and three seniors attended. He had taken the juniors round the Museum, and explained the general characters of many of the exhibits. He considered it a pity that leaders of junior excursions, who, in giving their services as leaders, often deprived themselves of an afternoon's enjoyment, should be so poorly repaid.

Mr. A. D. Hardy, F.L.S., concurred with Mr. Kershaw's remarks, and said he thought the time had arrived when the Club should take into consideration the advisability of altering the rules relating to juniors, and gave notice that he would move at the next meeting of the Club that the rules be amended by the omission of the provisions for junior members of the Club.

Mr. J. Shephard said that in his opinion it would be advisable not to elect any further juniors, and to allow the present junior members to become in the course of time associates if they so desired.

The chairman pointed out that, in accordance with the rules of the Club, it was necessary to hold a special meeting for any amendment of the rules.

Seven members having signed a requisition desiring a special meeting for the purpose of altering the rules, it was decided to hold the meeting on Monday, 8th September, prior to the ordinary meeting, to consider the motion notice of which was given by Mr. Hardy.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. J. C. Douglas, 583 Church-street, Richmond, and Mr. H. Witty, "Burleigh Villa," Ellingworth-parade, Box Hill, were duly elected as ordinary members of the Club.

GENERAL BUSINESS.

Mr. D. Best said he was pleased to see in the daily papers that the Government had consented to support a Bird Protection Court at the forthcoming exhibition, and asked if the Club intended to assist in any way.

The chairman said the Bird Observers' Club is organizing a court, in order to show what birds should be protected, and proposed distributing pamphlets illustrating the usefulness of the various species. He thought the matter of financial assistance might be left in the hands of the committee.

PAPERS READ.

1. By Mr. A. J. Kershaw, F.E.S., entitled "Additions to the Fish Fauna of Victoria" (No 4).

The author recorded the recent capture in Corner Basin of a large example of a pelagic fish, known as the Opah, *Lampris luna*, Gmel., a rare species, which, he believed, had not previously been recorded from Australian waters. A description of the specimen was given, which showed that it measured about 3 feet 4 inches in length and 2 feet 2 inches in its greatest depth. The Opah, the author stated, is remarkable for its brilliant colouration, rendering it, according to many authorities, one of the most beautiful of the pelagic fishes. It attains a large size, reaching to at least a total length of 4 feet, and its flesh, which is stated to be red in colour, is considered excellent eating. The species is widely distributed, being recorded from the British coast, Mediterranean, and the Atlantic and Pacific Oceans.

2. By Mr. R. T. Baker, F.L.S. (communicated by Mr. P. R. H. St. John), "On a New Variety of *Eucalyptus globulus* (*E. globulus*, var. *St. Johni*)."

The paper, being a technical one, was taken as read.

Mr. P. R. H. St. John said that he first discovered the tree on the banks of the Lerderderg River, in the Bacchus Marsh district, on 5th November, 1903, and had since visited the locality several times, collecting material and making notes. There were nine other species of eucalypts growing within a square mile of the tree, and at least 100 trees of the new variety are growing in the vicinity.

3. By Mr. R. Kelly, entitled "Observations on the Functions of Acacia Leaf-glands."

The author referred to the paper by Mr. A. D. Hardy, F.L.S., on "The Distribution of the Leaf-glands in Some Victorian Acacias," published in the *Victorian Naturalist* for June, 1912, reading which had led him to seek some reasons for the presence of the glands. He had, however, been unable to find any authoritative reference to the so-called glands, and it seemed to

be even doubtful if the growths referred to should be called glands at all. He then discussed various functions which they might perform, without professing to arrive at satisfactory proof of any particular function.

Mr. A. D. Hardy, F.L.S., remarked that he had listened to the paper with very great interest, but was not disposed to comment as fully as might be expected, in view of the reference to his own paper, as he was at present engaged in observations with experiments which were not yet ready for discussion. However, in passing, one or two matters might be alluded to. With the author, he was in doubt as to the function of the glands, so called, more particularly in the case of *Acacia mollissima*, of which a number of trees had been under almost constant observation, when no exudation had been seen excepting once, when one spring morning a single small drop glistening on a gland, and blocking the orifice, was affording breakfast to a small black ant. There was just sufficient clear liquid to be evident to the taste, to which it was quite sweet. He regarded the presence of minute animals in the glandular hollow as being equivalent to rats sheltering in a drain or barrel, or wood-lice under inverted flower pots, the nibbling of adjacent tissue being a result of environment, and not a cause of selection of such. While agreeing with much that the author had stated, he did not see eye to eye with him on several points, and hoped to have something to place before the Club at an early date.

Professor A. J. Ewart, D.Sc., congratulated the author on his paper, and said in his opinion it was a philosophical paper with an experimental leaning. He considered the glands to be structures produced by the plant, and not in response to stimulation by insects; the latter go in because they find there a shelter. The general structure of the glands suggests hydathodes (water-excreting glands), but some points, however, in the structure do not correspond with this theory. Another kind of gland, which is possibly a hydathode, is found on the leaves of the genus Coprosma, and is in the form of a pit beside the vein; the function of this is even more in doubt. Hydathodes enable the plant to get rid of surplus water, and hence are usually in action at night, and may not function at all during a dry season. There was much that could be said one way or the other, and a good deal of experimental work could still be done.

The author, in reply, said he did not intend to suggest that insects formed the glands, but that they bred in them. He mentioned that large numbers of Black and Silver Wattles along the Yarra, between Healesville and Launching Place, were being completely destroyed by the larvæ of some insect, but of course did not associate these with the insects of the glands. Settlers erroneously considered them to be the Pear Slug. Mr. F. Spry

said that the destruction was no doubt caused by the larvæ of one of the ladybirds of the genus Paropsis.

NATURAL HISTORY NOTE.

Mr. J. Shephard said that whilst visiting Brisbane recently he found an opportunity, through the kindness of Mr. Colledge, of the Field Club there, to visit some of the ponds in the neighbourhood of the city. In a swamp near Indooroopilly were found large numbers of free-swimming clusters of rotifers, and he succeeded in identifying them as *Lacinularia natans* and *L. racemovala*, Thorpe. The former species is very common around Melbourne, but the latter is unknown in Victoria. *L. natans* is here often associated with *L. elliptica*, a species first described in the *Victorian Naturalist*, and although undoubtedly distinct from the Queensland *L. racemovala*, approaches it fairly closely. *L. elliptica*, it may be mentioned, has been reported from South Africa. A fortnight later some of the specimens were living in Melbourne, but as none had survived until to-night, he was unable to exhibit them as intended.

EXHIBITS.

By Mr. J. W. Audas, F.L.S —Specimen of the fungus, *Mylitta australis*, Berk., commonly known as Native Bread, collected by the exhibitor at Nar Nar Goon, Gippsland, 26th July, 1913.

By Mr. F. G. A. Barnard.—Wild-flowers from Frankston, including *Pultenæa stricta*.

By Mr. F. Chapman, A.L.S.—Thin rock-slice, showing well-developed foliation and crumpling in clay-slate, from Germany.

By Mr. Edwin Cheel, of the National Herbarium, Sydney.—*Avena barbata*, Brot., "Barbed Oat-grass," collected by the exhibitor in Government House Domain, Melbourne, 9th January, 1913. Not previously recorded as growing wild in Victoria. It is a native of Europe, and may be classed as an exotic not yet sufficiently established to be considered naturalized. *Cystisus linifolius*, Lam., Flax Broom, collected by the exhibitor, between Pakenham and Tynong, Victoria, 11th January, 1913. It is a native of the West Mediterranean regions, and has already been recorded as a naturalized alien in Victoria.

By Dr. A. Morrison, M.D.—Two painted panels (in oils), showing coloured illustrations of some Western Australian wild-flowers.

By Mr. P. R. H. St. John.—A complete series of specimens of *Eucalyptus globulus*, var. *St. Johni*, in illustration of paper by Mr. R. T. Baker, F.L.S.

After the usual conversazione the meeting terminated.

A WESTRALIAN FORM OF THE ORCHID *PRASOPHYLLUM AUSTRALE.*

By Oswald H. Sargent.

(Communicated by Prof. A. J. Ewart, D.Sc.)

(*Read before the Field Naturalists' Club of Victoria, 16th June*, 1913.)

I first met with this plant in a bunch of orchids exhibited in a flower show in October, 1904. The specimens were imperfect, and, through an accident, were lost in drying. In September, 1905, my brother found a solitary scape on a gravelly bank of the York–Guildford road, about four miles from York. I reported this erroneously as "*P. cyphochilum* (?)" in the *Journal of the W.A. Natural History Society*, No. 3.

In September, 1907, my brothers found many scapes on the Helena road, off the York–Guildford road, about six miles from York. I made a very thorough examination, and concluded that the species must be *Prasophyllum australe*, R. Br. I reported the discovery as a new record for Western Australia at a meeting of the W. A. Natural History Society held 26th November, 1907. Shortly after this doubts were thrown upon my determination, and owing to unavoidable delays the matter has only just been cleared up. I have recently received from Dr. R. S. Rogers, of Adelaide, many dried and fresh specimens of undoubted *P. australe*, collected at Mount Compass, South Australia. After carefully comparing my Western specimens with these I am satisfied that there is no essential difference. My specimens are larger, more robust, and more richly coloured —all differences that may be due to habitat.

This Westralian form of *Prasophyllum australe* has a truly beautiful inflorescence, in this respect being perhaps unique in the genus. Closely examined, the individual blossom yields to that of *P. elatum*, R. Br.; but the half-open scape would be difficult to excel for effectiveness of colour scheme. The stem and leaf, together with the bracts, dorsal sepal, and petals are deep purplish-green, or "black," as it is often called; the lateral sepals and labellum are pure white, while shaded splashes of pink on callus and column tone and give piquancy to the vivid contrast of the other parts. There is a small detail I would add to the description of the species given in "Flora Australiensis": the anther connective is produced into a fine pungent mucro. This seems better developed in the Western form.

While morphologically my plant is so like its Eastern congeners, ecologically there are some remarkable differences. Dr. Rogers states that in South Australia *P. australe* grows in swampy or wet ground (*Trans. Royal Soc. of S.A.*, vol. xxxiii.,

p. 209), and Bentham records it from "wet places or in water" in Victoria ("Flora Australiensis," vi., p. 337). The Westralian form I have found only in dry places. I have found it in several localities near York, but always in well-drained, sandy, ironstone soil, which looks about as fertile as a brick. As a fact, much of it is quite otherwise, though not first-class. According to Rogers (*loc. cit.*), the flowers of the typical form are "sweet-scented"; the Westralian form has odourless blossoms. In South Australia December is the flowering month; here flowering is over by the middle of October. This early flowering is, perhaps, entirely due to the dry habitat.

The apparently extreme difference in habitat chosen by the Eastern and Western forms is astonishing at first sight; but it should be remembered that a swamp may be "physiologically dry," so the contrast in moisture conditions may be much less than it appears, or even non-existent from the plant's standpoint. Anyway, the case is not without parallel. *Caladenia longicauda*, Lindl., and *Pterostylis turfosa*, Endl., grow in swamps in South Perth (W.A.); but specimens collected therefrom are scarcely to be distinguished from specimens collected in York, where I have only found the species in dry places. *Pterostylis pyramidalis*, Lindl., grows in the bed of the Avon River in salty, black mud, and during the growing season is, in most years, completely immersed for over a month, while the river is in flood. I have transferred many specimens to dry, gravelly soil, and they have grown quite normally, and re-appeared year after year. The change to dry conditions has had not the least visible effect. *Caladenia Barbarossæ*, Reichb., occurs in similar situations, often in company with *Pterostylis pyramidalis*, and, like that species, it seems quite unaffected by transfer to a dry situation. I can only conclude that these species do not inhabit wet places for the sake of abundant moisture. Perhaps this is true also of *Prasophyllum australe* in South Australia.

A few notes on pollination and fruit production seem worth recording. On touching the rostellum with a suitable object (I used a match stalk in my experiments), the pollinia become attached, and are readily removed. As they leave the anther they spring up, and occupy a position in relation to the base of the caulicle diametrically opposite to that occupied while within the anther. This is brought about by a sharp bend of the caulicle near its base. After removal from the flower the pollinia, then standing erect, slowly fall till they regain their anther position and hang vertically down. This movement is complete about six minutes after extraction. If now the object bearing them be returned to the flower exactly as at first, the pollinia strike the stigma, and liberally besmear that

organ with pollen. I have never deliberately watched the flowers, but I have spent a good many half-hours moving about amongst them. So far I have not had the good fortune to observe an insect visit.

In 1911 I made an attempt to estimate the percentage of fruits produced by the flowers. I visited a locality where I had seen numerous scapes earlier in the year—on the 8th of November. Most of the scapes had vanished; probably they had been trodden down, or perhaps eaten, by horses or sheep. Diligent search discovered eleven scapes, with fruits just dehiscing—four with complete racemes and seven with the apices missing. This collection totalled just 100 flowers, of which 42 had produced fruit. Only one raceme was intact when I reached home. It bore 21 fruits and 24 infertile, withered flowers (46 per cent. of fruits). The lowermost fourteen flowers were all fertile, and the topmost few fruitless. It seems to be the rule that the early flowers are most successful in securing pollination, and the chances decrease as the season advances. So I judge from the fragments, and from scapes seen in other years late in the season. This suggests that the activity or prevalence of pollinators early in the season is a contributory cause of the earlier flowering of the Western form. It has triumphed in the struggle for existence, because it has found pollinators for its flowers sufficiently early to enable it to occupy the dry situation available. (Active life would be impossible for it after about the end of October.) That the pollinators are most active early in the season seems an advantage: the earlier flowering individuals stand the best chance of reproduction, and so the form tends to become better fitted for its arid home. Even now the last few flowers sometimes wither without unfolding. From this I conclude that the later flowers have small chance of maturing fruit, even if pollinated. If my ideas are correct, the Western form is really a distinct section of the species—distinct physiologically, but not morphologically. There has been no change of form, because structurally the flower was at the start (when the Western plant struck out on its own path) already perfectly efficient for its purpose. It seems we have here material for some interesting and useful experiments. Whether the Western plant has really altered at all is capable of determination by attempting to grow it in a swamp, preferably in South Australia or Victoria. The Eastern form should simultaneously be transferred to dry conditions. Many small details would require careful attention; but the difficulties are far from being insuperable.

SOME ALGÆ OF THE ZOOLOGICAL GARDENS, MELBOURNE.

By A. D. HARDY, F.L.S., F.R.M.S.

(*Read before the Field Naturalists' Club of Victoria, 16th June*, 1913.)

THIS is one of a number of disconnected papers which had been in preparation for some time, but suspended in anticipation of other botanical work of official and economic value. In examining various bodies of water in connection with the water supply of the Melbourne and Metropolitan Board of Works, I had occasion—especially in searching for the cause of the outbreak of salmon disease in the trout ponds of Studley Park—to examine the Zoological Gardens' fish ponds, and advantage was taken of the occasion to collect samples (at the invitation of the Director, Mr. D. Le Souëf, C.M.Z.S.) from other pools.

The garden pools are all filled from the same source—viz., the city supply from the Yan Yean reservoir, supplemented by water from the watershed of the Maroondah River direct from the mountain weirs, the former supply being rich and the latter poor in algal contents. But with this and other conditions affecting them all alike, the alga-flora of the respective pools varies considerably in quantity, and I have found no species paramount in all at one time. The pools are all shallow, with no conspicuous benthos. They have almost similar environment, the larger bodies of water being almost continually disturbed by captive aquatic birds. The pools may be thus identified: — "Flamingo Pool," "Crane Pool," "Seagull Pool." The first two of these are within stone-throw of each other, and the third not far removed.

Collections were made in 1910, and occasionally since, principally from the Flamingo Pool, which has attracted the attention of many visitors, who have commented on the singular appearance of the white-plumaged, pink-legged birds standing or wading in green water. This pool is about 100 feet long by 60 feet broad, with an average depth of two feet, and is bordered with a retaining wall of rough rockwork at the edge of the abutting grass lawns and shrubbery. Some spreading oaks near by and some palms give occasional shade. The collections were made chiefly during the warm season, and incidentally while I was engaged on other business. Although nothing in the nature of a systematic inquiry, or even an exhaustive single survey, was attempted, the results with regard to several points are interesting.

Throughout nine months of the year, the water of the Flamingo Pool is grass-green, the remaining three months being the winter season, during which the colour diminishes, though not to the vanishing point. During the warm season, cold snaps

of a few days' duration have temporary but not very marked effects. The colour is due to the great quantity of individuals of a few species only. At times one species dominates, and this, owing to causes not yet discerned, gives place to another of allied genus, and this, perhaps, in turn yields to species of different family, in one case the more advanced forms giving place largely to a plant from which they may have been phylogenetically derived. Towards the coldest part of the year, there is a steady increase of the animal constituents of the pool, such as rotifers, paramœcia, &c., and the plant organisms decrease proportionately; the winter season comprising late May and June, July, and early August.

In March, 1910, *Botryococcus Braunii* was visible at the surface, and the following species were diffused in abundance :— *Scenedesmus quadricauda*, *Merismopedia glauca*, and a plant somewhat resembling *Kirchneriella lunaris*, and which was dominant at that time. Considerable interest attaches to this last (*Ankistrodesmus quaternus*, W. and G. S. West), which hitherto has been recorded only for the place where it was first collected —viz., Burmah. The plant's typical habit is to appear as four loosely aggregated cells, each crescentic, with obtusely-rounded apices, and flattened somewhat, the four cells being opposed in pairs in cruciform arrangement, with their concave edges inwards. The local *A. quaternus*, which is embedded in a not very distinctly defined gelatinous investment, and approximately of habit as above described, had not always the cells regularly arranged. Though the convexities were usually outwards, as in the type, the common axis of one pair of opposing cells was frequently at right angles transversely to that of the other pair, so that, when one opposing pair of cells was viewed end foremost, the other pair appeared in side view. If further investigation shows that this feature is as common as inquiry up to date has shown it to be, varietal distinction (*A. quaternus*, var. *irregularis*, proposed) may be necessary, but I hesitate while examination of more material—not possible at present—may prove this to be merely a phase in the progress to maturity, and so the plant is referred to West and West's species. An occasional isolated cell (seen as figured on plate, fig. 2) having short spines, and thus resembling a single cell of Turner's *Closteridium Bengalicum*, gives me doubt as to whether the last-named species exists in the pool or that the cells of *A. quaternus* may occasionally bear spines; or, as a second alternative, that the connection between the allied genera of this family may be closer than has been hitherto regarded. *Scenedesmus quadricauda* ranked second. There were comparatively few of *Pediastrum duplex*, var. *reticulatum*, *Ankistrodesmus falcatus*, a species of *Palmella*, and *Navicula*, sp.

In January, 1911, *Ankistrodesmus quaternus* had diminished, and *Scenedesmus quadricauda* had become premier. This latter species was not in normal quadrate series, as before, but was, with few exceptions, in binate form, both cells bearing the spine-like processes characteristic of the type. *Pediastrum* was again present, but rare, as was also *Scenedesmus obliquus*, then noticed for the first time in that locality. *Merismopedia* was less evident, and *Navicula*, spp., were sparsely distributed. One collection, unfortunately not dated, shows *Sc. obliquus* to be the principal constituent, almost to the exclusion of others.

In May, 1913, the meteorological conditions were much different from those of preceding dates given. Instead of calm, sunny days, there were chill winds; intermittent cold showers freshened the water surface, and there had been little sunshine for days past. The Flamingo Pool water was still green, but held little of the algæ previously observed, while the abundance of rotifers, &c., was a prime feature. *Paramœcia* and other "animalcules" were frequent. *Palmella* had taken the place of the previously dominant *Scenedesmus* and *Ankistrodesmus*. For the first time in this locality, *Euglena spirogyra* was seen, and the present noting constitutes, I believe, the first record for Australasia and the Southern Hemisphere generally, though doubtless the species has been seen by members of the Field Naturalists' Club in other places and by observers in other States. Only a few individuals were noticed in the small sample examined, and these were typically solitary and slothful, and with contortion less Euglenoid than *E. viridis*. The eye-spot was distinct, the anterior and posterior extremities hyaline, and the flagellum so indistinct as to escape observation even with such aids as, at other times, made plainly visible the flagellum of *E. viridis* or *E. rubra*.* The spiral ridges or folds were distinct, and had the effect of occulting the green interior in such a way as to give the appearance of spiral green chromatophores, whence, presumably, the specific name. In the several specimens, two large amylaceous bodies were present—one in the midst of the anterior half; and one in the midst of the posterior coloured part of the organism. The occurrence of *E. spirogyra* is conveniently recorded here without any thought of claiming the organism as an alga. *Ankistrodesmus falcatus*, var. *acicularis*, was also present, but scarce, and in one specimen the chloroplast was fragmented and parietal. At this period the *Palmella* formed the bulk of the flora of the Crane Pool, and its principal constituent where the great amount of surface scum was almost exclusively composed of this plant. In this pool, the

* *Vict. Nat.*, March, 1911, p. 215.

thallus of the *Palmella* was observed to be of irregular form, but rudely approximating to lenticular, 1½ inches diameter and from ⅛ to ¼ inch thick at middle; of pale opaque green colour, and too weakly cohering to allow of its removal from the water intact. The largest, when collapsed in a phial, occupied a cubic centimeter. It is probably a form of *P. hyalina*, and is referred to that species, though the cells are larger. There were also filaments of *Oscillatoria* scattered throughout both Flamingo and Crane Pools.

A very small pool in the sea-gull enclosure, examined at this time, yielded almost negative results in algæ; there were, instead, plenty of Entomostraca, Culex larvæ, water-beetles, Amœba, &c., and diatoms. Macrophytes crowded this pool, prominent amongst them being *Typha angustifolia* and *Nymphea* and *Cyperus lucidus*.

The fish ponds, previously examined, are of small surface, and of greater depth than the pools, and partly covered by screens. There is a little benthos at the edges, and from this, as would be expected, the algæ were of character unlike those of the open, shallow, bare-banked pools. Great quantities of Fragillaria were a marked feature, and conspicuous desmids were *Pleurotænium Ehrenbergii* and *Cosmarium Hardyi*.

It is interesting to note that, excepting small quantities of *Merismopædia* and *Oscillatoria*, the micro-flora of the Flamingo Pool consists of chlorophytes, and that for long periods the pool is dominated by members of the Protococcoideæ, principally of the family Selenastreæ; and, further, that, while the water supply is largely from the Yan Yean reservoir, whence several species are probably derived, the interesting *Ankistrodesmus* is not thus accounted for, nor does the admixture of Maroondah water explain its presence. It may, with others, have reached the pool by atmospheric or ornithological agencies from unexamined northern areas. The introduction of birds from the Northern Hemisphere is a likely cause, as Mr. Le Souëf informs me that, although the exact locality whence came the wading birds such as cranes, flamingoes, &c., is not certain, their introduction to the Melbourne Zoological Gardens was direct from the Calcutta market. Algal spores might easily be carried in dried mud on the legs of such waders and survive the drought, of less than three weeks, occasioned by the voyage to Australia. Wild duck sometimes visit these pools, but do not fly from the northern areas (New South Wales, Queensland, and Northern Territory), wherein lie unexamined waters of a possible connection chain. The introduction of fish ova from New Zealand in wet moss (Sphagnum) to the Garden hatcheries has not been overlooked as a factor in distribution; but quantities of the moss used as packing

yielded only a few diatoms and filaments of a fungus (Saprolegniaceæ). Moreover, neither *A. quaternus* nor other than the cosmopolitan species of other genera mentioned have been recorded for New Zealand. There remains the migrating Spine-tailed Swift, which nests in Eastern Asia and visits Australia. This bird is said to be seen only on the wing, and to perch only in darkness. It has not been seen alighting near any water whereto spore-laden dried mud might be transferred. Mr. F. Chapman, A.L.S., in the *Victorian Naturalist*, vol. xx., p. 17, gave an interesting account of wind-borne deposits precipitated as red rain, and analysis of the material and reference to the meteorological data show this dust to have come from far inland. See also the following :—Rept. Austr. Assn. Adv. Sc., vol. vii., p. 334, and Jour. and Proc. Roy. Soc., N.S.W., vol. xxxvi., 1902, p. 241.

APPENDIX.

List of Species identified, with Notes, and References to accompanying plate.

ALGÆ.

Closterium Ehrenbergii, Menegh. [West and West, "Br. Desm.," vol. i., p. 143, Pl. 17, figs. 1–4.]

Closterium moniliferum, Ehr. [*Ibid.*, vol. i., p. 142, Pl. 16, figs. 15, 16.]

Cosmarium Hardyi, G. S. West. *Vict. Nat.*, vol. xxii., 1905, p. 72 ; *Journ. Linn. Soc.*, vol. xxxix., 1909, p. 64, Pl. 4, fig. 8.

The foregoing species were found only in the fish-ponds.

Pediastrum duplex, Meyen., var. *reticulatum*, Lagerh.

P. Ehrenbergii, Corda. [Cooke, "Br. Fr.-Wr. Alg.," ii., Pl. 18, fig. 1*h*.]

Scenedesmus quadricauda (Bréb.), Ralfs, "Br. Desm.," 190, T. 31, f. 12, Pl. v., fig. 3*a*, *b*, *c*.

S. quadricauda, f. *minor*, Ralfs. *Ibid.*, fig. 12*c*.

S. obliquus (Turp.), Kutz. [G. S. West, "Br. Fr.-Wr. Alg.," p. 220, f. 92*a*], Pl. v., fig. 4.

Cells average 16 μ. x 3.5 μ. ; pyr., 3.2 μ.

S. bijugatus (Turp.), Kutz. *Ibid.*, p. 220, f. 92*c*.

S. obliquus and *S. bijugatus* varied considerably.

Ankistrodesmus falcatus (Corda), Ralfs, *l.c.*, p. 180, T. 34, f. 3.

A. falcatus, var. *acicularis* (A. Br.), G. S. West, *l.c.*, p. 223, f. 94*b*, *c*, Pl. v., fig. 7.

A. quaternus, W. and G. S. West, *Ann. Roy. Bot. Gard., Calcutta*, vi., Pt. 2, 1909, Pl. ii., figs. 23–25.

Pl. v., fig. 1*a–p*, cell—length between apices, 13.5–17 μ. ; breadth, 6.5–10 μ. ; thickness, 3.5 μ., there being greater approach to constancy in breadth than in either of the other dimensions. The plant was never seen quite as shown by Dr. West in his figure, but frequently approximating thereto. Often the cells were arranged with the mutual axis of one opposing pair at right angles transversely to that of the other pair (fig. 1*b*). Nor was there ever a well-defined gelatine ; the straggling of the cells into various positions, but always in fours, being probably due to the semi-fluid nature of the colonial investment.

Selenastrum acuminatum, Lagerh. Turn., "Fr.-Wr. Alg. E. Ind.," p. 162, vol. xx., f. 30.

Without access to the original description, I am relying on the figure given by Turner, who quotes Lagerh. and Wallich. Only one plant

seen, and not preserved ; figure given is diagrammatic only ; length of centre cells, 45–48 μ. ; external, between apices, 33–38 μ. (Pl. v., fig. 6).

Selenastrum, sp.

Only one plant seen, and lost sight of in attempt to mount. Not measured, but of about the same cell length as the centre cells of the foregoing species, and of proportion as shown in fig. 6. The four slender arcuate cells, arranged back to back (cruciform in transverse section), have their attenuated ends reflexed (Pl. v., fig. 7).

Closteridium Bengalicum, Turn., *l.c.*, 158, Pl. 20, fig. 25.

Only one cell seen, and resembling a single cell of *Ank. quaternus* in all but the short spines of the blunt apices. Also something like *Closterium cuspidatum*, as figured in Supplementary Plate XXXV., fig. 11, by Ralfs. (Pl. v., fig. 2).

Dictyosphærium Ehrenbergianum, Näg. [G. S. West, *l.c.*, p. 236, f. 104.]

Only three plants seen ; diam., 4 μ.

Botryococcus Braunii, Kutz. [Cooke, *l.c.*, p. 15, VII., f. 2 ; G. S. West, *l.c.*, p. 237, f. 106.]

Palmella hyalina, Bréb., "Alg. Fal.," p. 39.

Cooke, *l.c.*, p. 11 ; V., fig. 3 ; but against the sizes of cell there quoted —viz., 0.5–1 μ., Rabenh., .75–1 μ., Kirch.—the local specimens are 3–4 μ.

Dr. G. S. West, *l.c.*, p. 240, has influenced my identification, after considerable hesitation, due to F. S. Collins, who, in his "Green Algæ of North America," * excludes from the genus all but *P. miniata*, Leiblein, and its variety *æqualis*, Näg. The thallus is only to be seen in its natural habitat, as it is too fluid to bear handling. Collapsed in a phial, one measured 1 c. cm. Several measured in the water were up to 40 mm. across the surface and about 7.5 mm. thick, and approximately lenticular, few having escaped damage by wading birds.

Fragillaria capucina, Desmaz.
Diatoma elongatum, Ag.
Synedra ulna (Nitzsch), Ehrenb.
Navicula viridis, Kutz.

The diatoms were identified by means of Van Heurck's monograph. The first three were plentiful in the fish ponds, and 22 was sparse in all pools.

Oscillatoria, sp.

Scattered filaments only occasionally seen, 1.5 μ. diam. ; more slender than *O. tenuis*, Ag., and with truncate—not attenuated—apices ; possibly *O. angustissima*, W. and G. S. West, of which I have no description, or an intermediate form.

Merismopedia glauca (Ehrenb.), Näg.

Thallus extensive—2,500 cells—but mostly found in smaller fragments of 32, 64, &c. ; 3.3–3.8 μ. is the size of cells given by Dr. West for above species. The plant from the Flamingo Pool and the Crane Pool is similar to that of the Yan Yean reservoir (hitherto unrecorded), and has cells of diameter .65 μ. only (Pl. v., fig. 8).

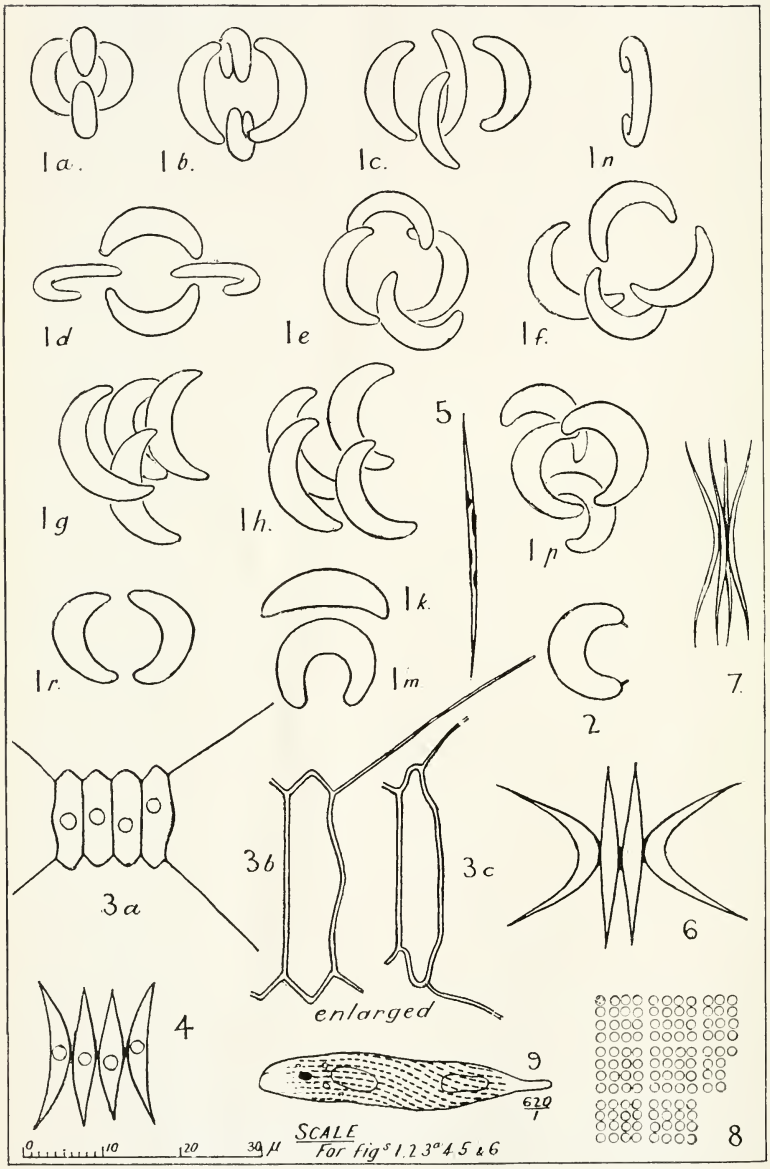
FLAGELLATA.

Euglena spirogyra. "Poggendorff's Annalen d. Physik, 1830, p. 508," in Ehrenberg's "Die Infusionothierchen," Leipzig, 1838, p. 107, Pl. VII., f. 10.

Ehrenberg describes the colour of this organism in three languages

* In Tuft's "College Studies" (1909), vol. ii., No. 3, p. 137.

PLATE V.



A. D. Hardy, del.

FRESHWATER ALGÆ FROM MELBOURNE ZOOLOGICAL GARDENS.

and by appropriate colouring of figure in plate respectively:—"gewundenes Augenthierchen," "fuscescente viridis," "à couleur verte brunâtre," and brownish-green. The specimens seen by me were all bright green—equal in that respect to *E. viridis*, which Ehrenberg distinguished as "grünes Augenthierchen," "Eugléne verte . . . . couleur verte, hyaline aux deux bouts," and again, "Colore viridis utroque fine hyalina." The name *E. viridis*, by the way, is also credited to Poggendorff's publication, which preceded that of Ehrenberg by eight years. Ehrenberg gives size as follows:—"Grösse 1/20 bis 1/10 Linie beobachtet," which (101–203 μ.), compared with an average size of the Melbourne form, makes the latter appear to be of less than medium size—viz., total length, 120 μ.; caudal attenuation, 13.6 μ.; breadth when extended, 16.2 μ.; amylaceous granules, 20.4 x 10 μ. and 20.4 x 8.5 μ.; stigma, 3.5 (Pl. v., fig. 9).

Trachelomonas, sp. ?

Common in all pools. To be further examined and referred to in a later paper.

EXPLANATION OF PLATE.

Fig. 1. *Ankistrodesmus quaternus*, W. and G. S. West.
1*c*. Oblique view of normal grouping.
1*a*. Frequently seen in immature stage.
1*n*. Strayed single cell (rare). 1*r*, single pair complement of cells missing (probably accidental).
1*k* and 1*m* illustrate extremes of curvature noted.
Fig. 2. Doubtful cell, like a solitary cell of *Closteridium Bengalicum*, Turn. (rare).
Fig. 3, *x*3*a*. *Scenedesmus quadricauda* (Bréb.), Ralfs; 3*b* and 3*c*, enlarged to show variations in cell contour.
Fig. 4. *Scenedesmus obliquus* (Turp.), Kutz.
Flg. 5. *Ankistrodesmus falcatus*, var. *acicularis*.
Fig. 6. *Selenastrum acuminatum*, Lagerh.
Fig. 7. *Selanastrum*, sp.
Fig. 8. *Merismopedia glauca* (Ehrenb.), Näg.
Fig. 9. *Euglena spirogyra* (Ehrenb.) A second figure should have been included in this plate to show the strap-like spiral form often assumed by this species in contortion, and to which the specific name may be due.

ADDITIONS TO THE FISH FAUNA OF VICTORIA. No. IV.

By J. A. KERSHAW, F.E.S., Curator Zoological Department, National Museum, Melbourne.

(*Read before the Field Naturalists' Club of Victoria, 14th July*, 1913.)

Family LAMPRIDIDÆ.

LAMPRIS LUNA, Gmelin.

Gmel., Syst. Nat., xii., 1,225, 1788.
Günth., Cat. Fish., ii., 416, 1860.
Day, Fish. Great Britain, i., 118, pl. xlii., 1880–4.

THE OPAH.
(Plate vi.)

On the 14th July last I had an opportunity of inspecting a strange fish which had been captured in Corner Basin, between Wilson's Promontory and the mainland, by Mr. W. B. Smith,

of Port Welshpool, and forwarded to the Melbourne Fish Market.

The specimen was rather badly damaged on one side, but was otherwise in excellent condition.

It proved to be a species known as the Opah, or "King-fish," *Lampris luna*, Gmel., a widely-distributed pelagic fish, which, so far as I am aware, has not previously been recorded from Australian waters.

The Opah is remarkable both for the large size to which it attains and its gorgeous colouration. Günther states it is "one of the most beautiful fishes in the Atlantic." Day says:—"This fish is an exception to the general rule that those which inhabit the tropical seas are most resplendent in colours, as none can surpass the Opah." The flesh is said to be rich and firm and of delicate flavour.

This example measured 3 feet 4½ inches in length to the tip of the caudal fin, and 2 feet 2 inches in its greatest depth. Its weight was given as 56 lbs. Specimens have, however, been recorded measuring up to 4 and even 6 feet in length.

The body is short, deep, and laterally compressed, and is covered with very small deciduous scales. The snout is short, and the mouth small and without teeth. The front of the dorsal, and the pectoral and ventral fins, are falcate. The lateral line is prominent, and is considerably arched above the pectorals.

D. (?) 46, V. 15, A. 37.

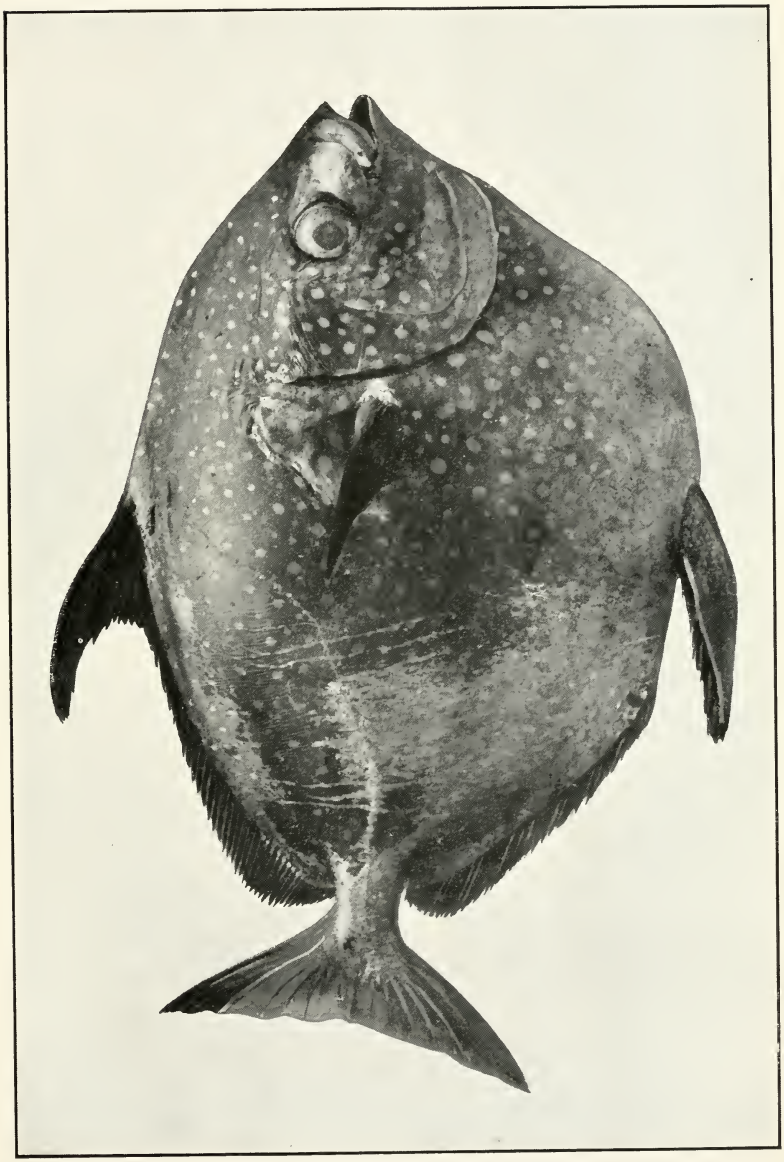
Colour.—The dorsal area is bluish-green, the sides violet, becoming silvery, with golden reflections, on the lower parts and towards the tail. The space in front of and below the eye silvery. Conspicuous oval silvery spots are scattered over the whole of the head and body, smallest along the dorsal area, with faint indications of a few on the dorsal fin. Snout, fins, and tail vermilion, with the extreme tips of all the fins whitish, and a silvery line along each ray of the caudal.

The colour is said to be subject to variation.

A number of examples of this fish have been taken on various parts of the coasts of Great Britain. Others have been recorded from the coast of Norway, the Mediterranean, and from the Altantic and Pacific Oceans. Day, in his "British Fishes," says:—"Among those captured in British waters we find many recorded. Sibbald obtained one from the Firth of Forth in 1664; Wallace from Sunda, in the Orkneys, in 1682; . . . . and one nearly 6 feet in length was captured in Sanday" (Orkneys).

Mr. Smith informs me that he previously captured a similar specimen of this fish near Oberon Bay, on the west coast of Wilson's Promontory, in 20 fathoms, but, owing to rough weather, was unable to save it.

PLATE VI.



THE OPAH, LAMPRIS LUNA, GMELIN.

The Victorian Naturalist.

Vol. XXX.—No. 6. OCTOBER 9, 1913. No. 358.

FIELD NATURALISTS' CLUB OF VICTORIA.

A special general meeting of the Club was held in the Royal Society's Hall on Monday evening, 8th September, 1913, to consider a proposed alteration of the rules by excising clause (*e*) (relating to junior membership) of rule 4.

The president-elect, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 40 members and visitors were present.

In accordance with his notice of motion given at the previous meeting, Mr. A. D. Hardy, F.L.S., moved—"That clause (*e*) of rule 4 be repealed," and, in speaking to the motion, said that it was with regret that he took this action, which became necessary from two points of view—the falling off in the junior membership and the lack of interest shown by those who remained. Members would remember the energy and enthusiasm with which some members, who were interested in educational matters, had taken the initiative and early steps in connection with the juniors, but latterly members had had their energy diverted to other matters, or had gone to other districts, hence there had been lack of enthusiasm as regards the juniors, and this section of the Club would have failed sooner but for the interest taken in it, until his death, by Mr. C. Stout, and by Miss Bury throughout. At present it was difficult to get more than half a dozen juniors to attend excursions or lectures, for which busy senior members unselfishly gave up their Saturday afternoons in the interests of the young people. No doubt the compulsory military drilling on Saturday afternoons was largely responsible for the falling off. This was not only a duty but a counter attraction and a pleasure. The remaining Saturdays appeared to be devoted to sport. In any case, looked at from a financial point of view, the section was a recurring loss in the Club's annual balancing of accounts. Provision could be made for the juniors already in the Club who had paid the current year's subscription, but no more juniors should be admitted. Present juniors might be admitted by amendment of another rule as associates, or drop out at the end of the current year. In seconding the motion, Mr. F. G. A. Barnard said that he did so with regret, as it seemed a backward step, but from the difficulty of keeping in touch with the juniors, except at a considerable expenditure of time and money, he failed to see that the Club could do anything else but repeal the provision for juniors at the present subscription.

In supporting the motion, the hon. treasurer, Mr. G. Coghill, said that when the rule was passed he drew attention to the fact that the subscription charged, one shilling, was not sufficient to cover the expense of stationery and postage. Mr. J. Shephard expressed the opinion that the alteration should take effect from the end of the current year.

Mr. F. Pitcher said he did not like any retrograde motion. It would, in his opinion, be a pity to abolish the junior section owing to their non-attendance at the excursions. The rule should stand as it is, and the committee should look into the matter.

The Chairman said it was understood that the repeal of the clause would take effect from the end of the current year.

The resolution was then put and carried without dissent.

The business of the ordinary meeting was then proceeded with.

CORRESPONDENCE.

From Dr. J. A. Leach, D.Sc., thanking the members of the Club for their kind remarks in accepting his resignation as President of the Club. Only a strong sense of duty to the Club and himself compelled him to relinquish a position he deemed it a great honour to occupy.

REPORTS.

A report of the excursion to Mitcham on Saturday, 23rd August, was given by Mr. G. Coghill, who said that the excursion, like the junior excursions, was poorly attended, only three members putting in an appearance, doubtless owing to the showery weather. They, however, went for a stroll through the paddocks, and secured several interesting wild flowers, such as *Acacia myrtifolia*, *Hovea longifolia*, &c.

A report of the excursion to Hurst Bridge on Saturday, 30th August, was given by Mr. J. W. Audas, F.L.S., who said that, notwithstanding the unsatisfactory state of the weather, the excursion was well attended. About thirty-five members and friends took part in the ramble among the wattles. After a walk of about a mile the party reached a spot known as Normalis Gully, where the Sydney Green Wattle, *Acacia decurrens*, var. *normalis*, was seen at its best, the variety having been planted there for economic purposes. The Red Box, *Eucalyptus polyanthemos*, was fairly plentiful, whilst isolated specimens of the Gold-dust Acacia, *A. acinacea*, and the Spreading Acacia, *A. diffusa*, were seen on the hills, where also *Hardenbergia monophylla*, *Hovea heterophylla*, *Leucopogon virgatus* and *Correa speciosa* were fairly plentiful among the timber. In the open *Kennedya prostrata*, *Anguillaria (Wurmbea) dioica*, *Hypoxis glabella*, *Brachycome graminea*, *B. decipiens*, and two Orchids, *Cala-*

denia cærulea, and *Pterostylis nutans* were among the plants seen in bloom. It was also noted that the Drooping Mistletoe, *Loranthus pendulus* was destroying the Silver Wattles, *Acacia dealbata*. Despite the bad weather, the party thoroughly enjoyed their outing and returned to town well laden with wattle blossom.

A report of the visit to the Botanical Laboratory at the University on Saturday, 6th September, was forwarded by Miss B. Rees, M.Sc., who acted as demonstrator. Twelve junior and senior members attended, and were greatly interested in the fine collection of botanical models and other objects on view.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. Einar Fischer, 57 Queen-street, Melbourne, was duly elected an ordinary member; Mr. H. C. Somerset, State Coal Mines, Wonthaggi, a country member; and Mr. Vincent Parer, 9 The Avenue, Windsor, as an associate.

GENERAL BUSINESS.

There being only one nomination for the vacancy in the presidentship, Mr. J. A. Kershaw, F.E.S., was declared elected. Mr. Kershaw thanked the members for the honour done him, and said he regretted that the alteration in Dr. Leach's duties had necessitated his resignation of the position, as he had always evinced so much interest in the Club.

PAPERS.

By Mr. F. Chapman, A.L.S., F.R., M.S., entitled "Victorian Fossiliferous Limestones and their Correlatives in other Lands."

This took the form of a lecturette, illustrated by a fine series of lantern slides, both of limestone occurrences and the contained fossils. The lecturer briefly explained the formation of the youngest series of limestones, such as the dune-rocks of the coast, and showed that the same process was going on in other parts of the world. Older formations were dealt with in like manner, the types of Victorian fossils occurring in similar formations in other countries being briefly referred to.

NATURAL HISTORY NOTES.

Mr. J. Booth, B.Sc., said that the following nature notes might be of interest to members:—

An aviary in Coppin-grove, Hawthorn, contains, among a few other small birds, a canary and a Love-bird or Warbling Grass-parrot, *Melopsittacus undulatus*, Shaw. These birds almost constantly sit on two perches opposite one another. The Love-bird follows the canary's song, which it renders with a husky and rougher voice, but with very considerable accuracy. It dances to the music.

A lady living in Hawthorn, and very fond of wild animals, has for months past been in the habit of feeding regularly an opossum which came every evening to the window. She was very sorry to lose its visits for about four weeks, when it returned, bringing two young "joeys" to be fed with her.

Mr. J. Searle drew attention to a specimen of a pelagic Tunicate, exhibited by him, and said the tunicates "sea-squirts" begin life as free-swimming organisms, tadpolelike in shape. With a few exceptions, which continue a pelagic existence, these later in life attach themselves by the head regions to some object and develop into a sessile animal such as we find on rocks at low tide. In the tail of the free-swimming stage of the Tunicata is to be found the first indication of a notochord. This is lost when the animal settles down to a sedentary life.

EXHIBITS.

By Mr. F. G. A. Barnard.—Two mounted specimens of the smallest Victorian marsupial, *Acrobates pygmæus*, Opossum Mouse.

By Mr. F. Chapman, A.L.S.—A series of limestone fossils and samples of fossiliferous limestones from Victoria and New South Wales.

By Professor A. J. Ewart, D.Sc., Ph.D.—A specimen of *Loranthus pendulus*, Sieber, Drooping Mistletoe, parasitic on *Cytisus proliferus*, L.f. Tagasaste, collected by Mr. J. B. Gregson, at St. Arnaud, August, 1913.

By Mr. C. J. Gabriel.—Marine shells in series. *Chlamys irradians*, Lam., from North America.

By Mr. J. Searle.—A specimen of a pelagic Tunicate from Corio Bay, Port Phillip.

After the usual conversazione the meeting terminated.

The Cabinet Timbers of Australia.—At the present time, when attention is being called to the terrible waste of timber going on in all parts of Australia, the publication by the Technological Museum, Sydney, of a handsome volume illustrating the Australian timbers suitable for cabinet work, &c., comes most opportunely. The Curator of the Museum, Mr. R. T. Baker, F.L.S., is to be congratulated on the excellent arrangement and get-up of the work. The coloured illustrations of the various woods are beautiful examples of colour-printing, and are true to life. Numerous illustrations are also given of articles and uses to which the timbers may be put. A brief description of each tree is given, but one essential point seems to have been overlooked—that is, the average size of the logs which are available for cutting up. Sixty-four species are described, of which sixty are represented in the coloured illustrations. The work is well indexed, and is a credit to the Government Printer of New South Wales.

BOTANICAL NOTES OF A TRIP TO MILDURA.

By H. B. WILLIAMSON.

(*Read before the Field Naturalists' Club of Victoria, 14th July*, 1913.)

TAKING advantage of the Royal Agricultural Show holiday in the first week of September last, I journeyed to Mildura to see that famous irrigation settlement, and to note the interesting vegetation of the extreme north-west of our State. I had been warned that, to see Mildura at its best, I should not visit it so early in the season, as the irrigation channels would not be running, the vines would not be in leaf, and none of the most interesting operations in connection with the fruit industry would be in progress. This warning did not deter me, for those things were of little importance to me compared with the advantage of seeing the native flora at a good time, if not at its best.

Leaving Ballarat by the 8 a.m. train on Saturday, 31st August, I did not arrive in Mildura (300 miles) till about 5 a.m. the next day—a tedious journey of 21 hours. This included some long stoppages, which to me seemed quite unnecessary. The only unusual incident of the journey was the circulation of handbills in the railway cars warning passengers of the penalties to be incurred by taking to Mildura, in their luggage or otherwise, any bananas. The reason of this precaution—fear of the Mediterranean fruit-fly—was given, and one could only admire the wisdom of the Fruitgrowers' Association, which thoroughly believes that prevention is better and cheaper than cure.

The task of obtaining suitable board and lodging was somewhat difficult, good accommodation houses not being numerous. As most people know, there are no hotels at Mildura. The large coffee palace near the railway station, I was told, has a wine bar—the only one licensed in the town. This was one reason why I did not choose to stay there ; and I visited three other houses before I obtained suitable accommodation.

I was much impressed with Mildura as a town. It is really a very fine, up-to-date place. The settlement is laid out in square blocks, and those thoroughfares running out from the Murray River are called avenues, and are named chiefly after trees—"Palm" and "Pine" avenues—and some after notable persons—"Deakin Avenue," for example. Across these run streets numbered First, Second, Third, and so on. For utility one can understand the advantages of the plan ; but it struck me as being too stiff. Those who laid the plan did so just as a farmer blocks out his land into square or oblong paddocks, not as a city architect, who lays down the streets with pleasing curves, crescents, and open spaces—squares and ovals—with

radiating streets here and there to vary the monotony, and lend somewhat to the purposes of tasteful decoration. The one redeeming feature is the system of tree-planting. The streets are splendidly planted. Deakin-avenue, for instance, has a fine double row of trees, including a strip of garden between. Sugar-gums and other eucalypts are in evidence. Some streets are lined with fine rows of pepper-trees, *Schinus molle*; others are planted with olives, and some with palms. These palms are a feature of Mildura street decoration. Two species are favourites — one being a kind of date palm. Both have immense trunks, and one has leaves fully 10 feet long, like long fern fronds. I came across a fine row of these about two miles from the railway station, and there is another splendid row in front of Mr. W. B. Chaffey's residence. The streets are well lighted with electricity. A special water-tower for domestic and street service is filled by a pump from the river, and the whole settlement is supplied during the six months beginning with October with water for irrigation, by means of two large pumping stations on the Murray and several auxiliary distributing stations—Nichol's Point, for instance. I visited one large plant at Merbein, about five miles down the river. Here, powerful pumps send 19,000 gallons a minute to a large outlet, 190 feet above the river. From this outlet it runs in large channels, and is distributed to the holdings on the western part of the settlement. The machinery was being overhauled, to be ready to start pumping in a few weeks.

Afraid that I would miss a good deal of what I went to find, I did not inquire into the social and industrial conditions of the town, although I knew of several residents who would gladly have given me opportunities of doing so. I went straight out to inquire of Nature, and I feel sure that I got reliable answers.

The river flats at Mildura much resemble in appearance and vegetation those higher up the Murray—for example, at Echuca and Albury. The chief characteristics are the immense Red Gum trees, *Eucalyptus rostrata*, and the light-coloured mud which encrusts the earth and logs below high water mark; but here the banks are higher and a smaller area is periodically flooded. The town is situated at a bend of the river, on a high bank, probably 150 feet above the summer level. Looking from the railway station, one can see up the river for a mile, and by turning a quarter-circle can look down stream for perhaps the same distance. Across the river, on the New South Wales side, the bank is much lower, and in flood-time is covered in for miles; but the presence of a few houses on that side indicated that there are some areas left high and dry when the water rises. A primitive punt, half a mile above the

town, serves to transport vehicles and stock. There is another punt between Mildura and Wentworth. Both have the same appliances—wire rope under water, large grooved wheel and hand crank, and boards, like rudders, to be set at an angle to the current; but I noticed a great difference in the manner of working the two. At Mildura the man in charge had to work very hard at the crank, whereas at the Wentworth punt the attendant did not touch the crank when in mid-stream. I think it was because in the latter case the angle-boards were set to the best advantage, and the current pushed the punt across. Between the punt and the town is a three-decked wharf made to suit the varying heights of the river, and close to this a sawmill and a pumping-plant—the former cutting up Red Gum logs, and the latter employed in keeping filled a large tank on a high tower, which supplies the town by means of the usual underground pipes. Near these works I gathered, in flower, *Mollugo hirta*, Hairy Mollugo, *Panicum gracile*, Slender Panic-grass, *Eclipta platyglossa*, Yellow Twin-heads, and *Euphorbia Drummondii*, Flat Spurge, the two last-named being in luxuriant clusters a foot across, close to the water's edge.

By the track leading to the mills there stands a specimen of *Acacia stenophylla*, Eumong, a shapely tree 30 feet high, with long drooping phyllodes. A few hundred yards down the river are the swimming baths—a floating enclosure moored to the bank, and provided with dressing rooms and electric light. Close to this splendid institution I was delighted with the fine show made by *Swainsona microphylla*, Small-leaved Darling Pea, and *Calotis cuneifolia*, Wedge-leaved Burr Daisy—the former with its long racemes of purple flowers and fern-like leaves, and the latter with large blue daisy heads. Both were plentiful. *Brachycome chrysoglossa*, Golden Daisy, grew also on the banks near by. I had found these two composites associated on the Murray near Rutherglen in 1910. In a small lagoon further down was growing the submerged *Jussieua diffusa*, Clove Strip, not yet in flower, and much of the water was hidden by a carpet of *Azolla rubra*, Red Azolla. Here, again, were trees of Eumong without flowers or fruit.

After crossing by the Mildura punt, and bearing a little to the east, a belt of sand-ridge is entered, on which much interesting vegetation appears. The track is of red sand, and where it is sloping it is difficult for bike riding; but on level stretches the sand is bound by brick-red clay, identical with what pedestrians in the streets of Mildura have, after rain, to scrape off their boots. The red track winding among the trees, bordered with dark green herbage, sprinkled with white daisies and Blennodias, formed a pretty picture. The daisies comprised *Brachycome pachyptera*, Hard-head Daisy, and *Helip-*

terum cotula, Mayweed Sunray ; but *Blennodia lasiocarpa*, Hairy Blennodia, white, with a tinge of pink and blue, formed a dense carpet in places. In every direction a distant view of the ground through the spaces between the trees reminded one of a snow scene, only wanting corresponding touches on the pine boughs to make the illusion complete. The herbage consisted otherwise of *Helipterum moschatum*, Musk Sunray, *Alyssum minimum*, Desert Alyssum, and several species of Zygophyllum —*Z. iodocarpum*, Violet Twinleaf, *Z. ammophilum*, Sand Twinleaf, *Z. crenatum*, Notched Twinleaf, and *Z. glaucescens*, Pale Twinleaf. Less abundant were *Millotia tenuifolia*, Soft Millotia, *Senecio brachyglossus*, Slender Senecio, *Parietaria debilis*, Forest Pellitory, *Poranthera microphylla*, Small-leaved Poranthera, *Calandrina calyptrata*, Pink Purslane, *Polycarpon tetraphyllum*, Four-leaved Allseed, *Stenopetalum lineare*, Narrow Thread-petal, *Craspedia pleiocephala*, Small Buttons, *Lappula concava*, Slender Burr-weed, and *Lepidium papillosum*, Warty Peppercress. The trees and shrubs represented were, besides the small eucalypts, *Eucalyptus bicolor*, Blackbox, and another, probably *E. hemiphloia*, Grey-box, *Myoporum platycarpum*, known locally as "Sandalwood," and *Callitris robusta*, Murray Pine or Marong. All reached a height of 50 or 60 feet. The pines are fine, symmetrical trees, and give to these sand-ridges their character and name, "Pine Ridges." The settlers at Mildura use the timber for posts for vine-trellises—I suppose on account of its white-ant-resistant properties. Boat-loads of pine posts from groves some miles up the river were being unloaded at Merbein, near the pumping plant. Among the pines a few small trees of *Eremophila oppositifolia*, Twin-leaved Emu-bush, in full bloom, with large, white, tecoma-like flowers stood out as real ornaments, and *Hakea leucoptera*, Needle Hakea, *H. vittata*, Striped Hakea, showing fruit sparsely, and *Exocarpus aphylla*, Leafless Ballart, with its tangled branchlets, added interest to the pine-groves. The last four named reached a height of 12 feet. *Grevillea Huegelii*, Comb Grevillea, with its rigid, spiny foliage, was seen frequently, but not bearing flowers. The Casuarinas noted were *C. lepidophloia*, Belar, and another, probably *C. Luehmanni*, without flowers or fruit.

In this locality is a small country school, the teacher of which, Mr. P. Murray, I found a congenial companion in my ramble round Golgol, as the place is named. He took me to a lignum swamp, and showed me the only specimen he knew in the locality of *Fusanus acuminatus*, Sweet Quandong. This was a miserable specimen, however, and the fruits, not yet ripe, seemed to be affected with some fungoid disease. Near the lignum swamp, which yielded nothing of interest, some fine specimens of *Myoporum platycarpum* were growing, and

not far away, in a creek, we found *Polygonum plebejum*, Small Knotweed—a creeping plant resembling the common wire-weed, *P. aviculare*.

Wishing to see Wentworth, and knowing that the rain had made some parts of the road almost impassable for a bicycle, I took the coach on the Wednesday for that town, which is situated about 18 miles from Mildura. The punt is reached in about 14 miles, after passing through some interesting vegetation near Merbein. This I determined to investigate the next day. Two introduced plants were much in evidence—*Inula graveolens*, Stinkwort, and *Nicotiana glauca*, Tree Tobacco, the former appearing only as dried remains of last year's plants, the latter being sparingly in bloom. Both these plants cover a large extent of land. The Tree Tobacco formed in places a thick scrub for hundreds of yards along the track, and little else was seen amongst it. The coach-driver told me that this useless weed covered hundreds of acres on both sides of the Murray. Just after leaving the punt is seen a pumping plant, erected by the New South Wales Government for irrigating the holdings taken up in the locality. It is worked by a suction-gas plant, supplied with charcoal from furnaces or retorts a short distance away.

For two miles the track led through a forest of small timber, apparently *Eucalyptus bicolor* and *E. hemiphloia*. These trees, and the *Eucalyptus rostrata* of the river flats, no doubt yielded good bee-forage, as was suggested by a small bee farm we passed on our way. After that the track led over an alluvial plain of whitish clay soil, very muddy on account of recent rains, and scantily covered with salt-bush and a few eucalypts. Some dark green bushes, like *Salicornia abuscula*, I determined to investigate on my way back, as I suspected they were *Pachycornia robusta*, Desert Glasswort.

The coach crossed a fine bridge over the Darling, and we were in Wentworth, a town that one soon perceives to be an "old-timer." The bridge has a central section, which can be raised horizontally to allow steamers to pass under. What a contrast the town presented to the self-contained, busy, up-to-date Mildura! It seemed to exist for the coaches—and there are many—that pass through from Renmark, Menindie, Euston, Balranald, and other towns. I could see no signs of industry —no farms, orchards, or factories. A large, factory-like building on the outskirts was pointed out to me as the gaol! Wentworth seems just a convenient emporium for goods for the surrounding sheep stations, and employés on these stations, I expect, have their homes here, where their families can have the advantages of town life, and where their children can attend school. I visited the public school, which was at

work, and the head teacher and assistant kindly showed me round. About 100 children were present. In reply to my inquiry as to places of historic interest, especially in connection with Sturt's trip, I could not get anything definite. Sturt is supposed to have rowed up the Darling to where the bridge is, close to the school-ground.

I walked about a mile to the junction of the two rivers, and took some photographs, which show only giant Red Gums and a fine stretch of river, which is, below the junction, four or five hundred yards wide. Rambling across the Darling bridge, I got little of interest except the rare *Limosella Curdieana*, Broad-leaved Mudwort, growing in water at the edge of a small lagoon. I had previously found it near Mildura, in a clay depression that was drying up. I also made sure of the Desert Glasswort. This is also a rare plant. Baron von Mueller mentions it as occurring in Victoria, "on the Murray, towards its junction with the Darling."

On our return drive we overtook a waggonette loaded with baskets of cod-fish. It was drawn by three horses, and contained a ton of fish, caught, so my driver informed me, 40 miles down the river, on the Victorian side. In the evening I photographed the driver unloading the fish at the Mildura railway station, from which place it was consigned to Melbourne.

The next morning I visited Merbein, and was shown the pumping plant which supplies the western channels of the settlement. Near the pump-house I noticed several fine shrubs of *Acacia salicina*, Willow Wattle, just coming in bloom. The flower-heads are a rich orange-yellow. On the bank of the river, close to the water, *Nicotiana suaveolens*, Sweet Tobacco, and the rare *Myriocephalus Stuartii*, Tall Thickheads, were in bloom, while up near the outlet an acacia, called by the coach-driver "Boree," formed a fine shelter over a bushman's hut. I failed to find anything besides phyllodes by which to determine the species.

I rode home past the "Lake" school. This school has a good garden and agricultural plots, so, being interested, I took the liberty of trespassing to inspect them. When I had done so, and was preparing to depart, a lad who was driving past ordered me off the premises in tones more forcible than polite. He got away too quickly for me to let him know, as I wished to, that I was not offended (as his rapid retreat seemed to suggest I ought to be) by his solicitude for the welfare of his garden. We are getting more and more of this—"Our school," "Our garden"—and it augurs well for the rising generation and for the protection of public property. Near the school is a splendid specimen of *Acacia homalophylla*, Myall, about 25 feet high, and very symmetrical. It was a mass of bright

yellow bloom, and I had to spend several minutes admiring it from various points of view. At the edge of a small lake near by, trees of *Acacia stenophylla*, Eumong, were noted, bearing their peculiar pods—constricted between the seeds. The Tree Tobacco was very abundant round this spot. In this locality also are to be seen miniature canyons, examples of the work of rapid corrosion of water-courses, the soft clay being carved into narrow gorges ten or twelve feet deep and only a few feet across.

Between Mildura and Merbein are some hundreds of acres of land almost bare of vegetation. Wind is responsible for this. Shallow-rooted plants have been removed by the wind, and the red loam has been formed into ridges and dunes. At Merbein, between the river and the "Lake" school, the typical vegetation of the sand-ridges occurs. *Casuarina lepidophloia* and *Myoporum platycarpum* are common, the latter just coming into bloom. Small trees of *Hakea leucoptera* and *Heterodendron oleæfolium* abound, the latter called locally "Cattle-bush." I found a few bearing fruit. Here and there under these plants are clumps of Zygophyllums—chiefly *Z. apiculatum*, Pointed Twinleaf, *Z. iodocarpum*, and *Z. crenatum*—and among some of these I gathered, without knowing it till I reached home, a species new to Victoria, *Z. ovatum*, lately described by Prof. Ewart, in conjunction with Dr. Jean White, from specimens sent from Western Australia. *Menkea australis*, Fairy Spectacles, also occurs here. On an orchard in the vicinity a fine clump of bamboos (Bambusa) was seen. The young shoots are peculiar. Many were 40 feet high and quite bare, leaves not yet having appeared on them. They looked like immense fishing rods, and seemed dead, but the orchardist drew my attention to the young leaves sprouting.

A walk along the railway line towards Merbein proved profitable. Bushes of various Kochias and Bassias and other salsolaceous plants are abundant. In addition to those already mentioned, *Kochia aphylla*, Leafless Blue-bush, and *Kochia villosa*, Silky Blue-bush, were found fruiting sparsely. Here, too, I found three Bassias—*B. diacantha*, Two-spined Salt-bush, *B. quinquecuspis*, Spear-fruited Salt-bush, and *B. lanicuspis*. This last-named species, Prof. Ewart informs me, has not hitherto been recorded for Victoria. It is much like *B. diacantha*, but its fruit-spines are half an inch long. Formidable pests to cyclists must these three species be. I was told that everyone in Mildura possesses a bicycle, and I think that the statement is scarcely exaggerated, judging by the number of cycle shops there. One rider told me that some of the tracks, especially over the river, were impassable without punctures owing to some spiny plants growing along them, particularly

a plant he called "Bindi." I think these Bassias must be responsible for the trouble. In a wet flat near the railway large bushes of *Rhagodia spinescens*, Thorny Salt-bush, were growing, and between them grew *Marsilea quadrifolia*, Nardoo, *Veronica peregrina*, Wandering Speedwell, *Myosurus minimus*, Mouse-tail, and *Ranunculus parviflorus*, Small-flowered Buttercup.

Another spot, interesting chiefly for its show of flowers, was a vacant space in front of the residence of Mr. W. B. Chaffey, one of the promoters of the settlement. There were shrubs of *Templetonia egena*, Round Templetonia, covered with dull yellow flowers, bushes of *Olearia pimeleoides*, Pimelea Aster, showing masses of large white flowers like garden marguerites, the Cassias, *Sturtii*, Dense Cassia, and *eremophila*, Desert Cassia, with their yellow flowers, as well as *Acacia salicina*, not fully in flower. These, with some plants of Twinleaf and other herbs previously named, made a splendid show. The settlement area, I understand, was once covered with timber, but one would scarcely think so, as few stray specimens of trees remain. All vacant blocks are covered with salt-bushes and blue-bush, invaders in neglected territory. On one open space near the State school are the Kochias, *villosa*, *pyramidata*, and *sedifolia*—the last-named called "Blue-bush," although the name "White-bush" would suit it better—*Bassia sclerolænoides*, Woolly-fruited Salt-bush, *Enchylæna tomentosa*, Ruby-bush, *Salsola kali*, Prickly Saltwort, *Chenopodium microphyllum*, Small-leaved Goosefoot, and *Atriplex semibaccatum*, Berry Salt-bush.

The following plants are found in the railway enclosure and on various vacant blocks in the centre of the town:—*Kochia brachyptera*, Wingless Blue-bush, *Atriplex spongiosum*, Spongy Salt-bush, *Bassia paradoxa*, Curious Salt-bush, *Rhagodia nutans*, Nodding Salt-bush, *Chenopodium atriplicinum*, Purple Goosefoot, besides most of the Twinleafs and *Cassia Sturtii*, which last appeared at its best. The new Agricultural High School stands on a block of virgin land, and many of the plants just named are found there. *Zygophyllum fruticulosum*, Shrubby Twinleaf, and a narrow-leaved form of *Z. Billardieri*, Coast Twinleaf (so common at Queenscliff), were flowering nicely on the old fence round the block. With regard to this genus, it will be noticed that I collected all the seven Victorian species, as well as an eighth as a new record. All were in bloom. In this block were shrubs and herbs showing neither flowers nor fruit, and I am sure that a list of plants growing in those few acres would be an interesting record, if made by the nature students of the school. The plants, I expect, will all give place shortly to more valuable products, when every available foot will be under cultivation.

A ride up the river-bank towards the cemetery takes one across a small plain studded with *Atriplex nummularium*, Old-man Salt-bush. The plants have been well grazed over, and nothing but rigid, almost spiny, branches are presented on the outside. The only other plant in flower in this clay flat was *Brachycome pachyptera*, Hardhead Daisy, and this looked well, making as it did an almost continuous carpet of white daisies. Coming back past the cemetery, the pumping plant, and Nicholls Point State school, with its prize garden, I was able, owing to the late hour, to spend only a short time at each, and then to push on rapidly through Irymple, without being able to give more than a glance at the beautiful orchards which proclaim the remarkable fertility of the soil. However, the picture presented by a single orange tree, covered with its deep-coloured, almost scarlet fruit, standing alone in a grove of fruit-laden lemon trees, pulled me up short, and thrilled me with delight. Fine bushes of *Cassia eremophila*, Desert Cassia, and the rare *C. phyllodinea*, Leafless Cassia, and, of the Acacias, *salicina*, *colletioides*, and *oxycedrus*, Willow Wattle, Furze Wattle, and Spike Acacia, were blooming all along the roads towards Irymple school.

Having spent five days at Mildura, I left, regretting that I could not stay a few weeks to study the later-flowering plants, including the grasses, few of which were in bloom. The weather was not very favourable during my stay. Rain fell at intervals, and spoiled some of my outings, and I shall never forget my experience of Mildura mud, especially that which clogged my bicycle, so that I had to carry it to a pool to wash it before I could trundle it home. To see pedestrians on the streets calmly tramping through the red mud, of the consistency of mashed potatoes, made me wonder whether the citizens had really given up all hope of having cement, asphalt, brick, stone, or wood-paved streets and footpaths. I was told that the same mud, dried and pulverized, forms, a few months later, one of the terrors of the summer. By the colour of it one can understand the origin of the term "brickfielder" as applied to a hot-wind day in those parts.

As to the birds of Mildura, I was disappointed at seeing so few. Brush Wattle-birds, Red Wattle-birds, Miners, and Magpie-Larks were among the casuarinas, and I saw one White Egret on the Murray. The trustful little Ground-Dove interested me as it ran along close to the track. The most remarkable thing to me was the absence of White Cockatoos. As a rule, the almost deafening cries of these birds is a characteristic of the Murray flats, but during my stay at Mildura I did not hear one. I was informed, however, that these birds are very numerous, and that they destroy large quantities of almonds.

I saw several Leadbeater's Cockatoos in captivity, and heard that both they and the Pink-breasted (Galahs) were common round about.

In conclusion, I wish to thankfully acknowledge the assistance I have received from Professor Ewart and his staff in determining doubtful species of plants collected, and also to express my thanks to Mr. H. W. Casey, of Mildura, for information kindly supplied.

A PLEA FOR THE MURRAY PINE.—Some years ago, when visiting the Riverina district in the vicinity of Moulamein, in company with Mr. A. J. Campbell, I was grieved to see the rapid disappearance of the Murray Pine, *Callitris robusta*, var. *verrucosa*, before the axe of the settler. This tree yields perhaps the most useful of Australian timbers in the interior, being white ant proof, but, unfortunately, is generally of small size, rarely exceeding 15 to 18 inches in diameter at the base, and as the trunk tapers rapidly, it consequently takes a large number of trees to furnish sufficient timber for a moderate-sized building. At a saw-mill which we visited the waste was very great. Seldom did a log produce many boards six inches wide from fourteen to sixteen feet long. These were sold at from 12s. 6d. to 14s. 6d. per hundred feet running. Mr. Williamson, in his paper on the botany of Mildura, speaks of this pine furnishing the stakes required in the vineyards, and, as the smaller trees are used for fencing posts, the demand must soon exceed the supply. Another use to which this pine was put some three or four years after our visit was to furnish food for the settlers' sheep during a severe drought. For this purpose the friends with whom we stayed used no less than 1,700 trees, the sheep being particularly fond of the foliage. These trees, it may be mentioned, were all cut by the two girls of the family, their brother being ill in bed at the time. Notwithstanding the demand for this timber, we hear of no steps being taken to replant to meet the demand for future supplies. I have written these notes in no spirit of fault-finding, for I fully recognize the many and various uses to which the timber can be put, but to me it is lamentable that for so many years no effort has been made to provide for the future. Here is an opportunity for the Forest League to do practical work in calling attention to the immediate necessity for placing the Murray Pine timber trade under some sort of control. It seems strange that all remedies for good have to be forced physic-like on those most interested. Our own Club also, composed as it is of lovers of nature, should assist in bringing into prominence the rapid disappearance of this pine on the Victorian side of the Murray, and the urgent necessity for some steps being taken to prevent its ultimate extinction. Those who have seen a pine ridge will not readily forget the peculiar charm of the sight. We

had the opportunity of visiting an untouched one in springtime, when the grass was beautifully green: the trees, dotted about as in a park, yielded delightful shadow effects in the afternoon sun, and, the base of the ridge being fringed with Bursaria and other bushes, the whole made a perfect picture of loveliness.—Jos. Gabriel.

Rabbit Destruction.—Mr. Frank Allan, Chief Inspector under the *Vermin Destruction Act*, Victoria, has issued, in pamphlet form, particulars for the preparation and use of the poisoned baits used by his department throughout the State. The baits used are phosphorized pollard and strychnined apples, carrots, quinces, or pears. Land-owners sometimes use phosphorized wheat or oats, and jam and strychnine, but Mr. Allan does not recommend these, on account of the liability of destroying useful birds, &c. He pins his faith on the apple and strychnine bait, having had the best results from it, and says with it there is little or no risk of doing harm, the only birds which he has known to have been destroyed by this bait being an odd crow or magpie. We hope his statement is correct, and, if so, steps should be taken to prevent the extensive use of poisoned grain, which must take its toll of our most useful birds. Mr. Allan will be glad to have definite proofs of destruction of useful birds, by means of poisoned baits, forwarded to him at the Lands Department, Melbourne, whence also copies of the pamphlet can be obtained by those interested.

The All-Australian Exhibition.—The Bird Protection Court at the Exhibition Building has attracted considerable attention from the inquiring public. Several interesting leaflets have been issued by the committee, which should serve to call attention to the usefulness of our birds, and their unnecessary destruction.

Australian Trees and Shrubs in Ireland.—The *Kew Bulletin*, issued by the Royal Botanic Gardens, Kew, England, contained, in a recent number (No. 3, 1913), an interesting article descriptive of a visit to several notable estates in Ireland, where the acclimatization of trees and shrubs from foreign countries has been made a study. It is pleasing to read that so many Australian shrubs and trees are flourishing there. Amongst those mentioned are *Leucopogon Richei*, *Hakea ulicina*, *Acacia verticillata*, *A. pycnantha* (25 feet high), *Pomaderris apetala*, *Lomatia longifolia*. At Kilmacurragh are *Notofagus Cunninghamii*, 40 feet high, with a trunk 17 inches in diameter: *N. Moorei*, 25 feet high; *Arthrotaxis cupressoides* (Tas.), 20 feet high; *A. laxifolia*, 35 feet high; *A. selaginoides*, 35 feet high, with a trunk 12 inches thick. Several New Zealand trees, such as *Fuchsia excorticata*, 15 feet high; *Senecio Greyi*, 6 feet high; and *Griselinia littoralis*, 20 feet high, are also mentioned.

"The Austral Avian Record."—The August part of this magazine, being No. 1 of vol. ii., is to hand, and contains the usual budget of additions and corrections to the names of Australian birds. "The Colouration of the Palate and Pharynx of Australian Birds" forms the subject of a short article by Dr. J. B. Cleland, who gives those particulars regarding some seventy species. The editor's (Mr. Gregory Mathews) additions and corrections are mostly trinomials—thus the Northern Territory bird, *Amytornis rufa*, recently described by Campbell and Kershaw in *The Emu* (xii., p. 274) becomes *Diaphorillas striata rufa*. The new genera formulated are Austrotis, Neonectris, and Kempiella, the latter for a yellow-breasted robin from Cape York, North Queensland.

Timber-boring Insects.—The *Journal of Proceedings of the Royal Victorian Institute of Architects* for July last contains an instructive paper, read before the Institute by Mr. Chas. French, jun., Government Entomologist, in which he deals with insects infesting timber, notably those which attack the beams and timber of houses, and frequently the furniture contained therein, more especially if constructed of bamboo or wicker. Methods of treatment are given, and suggestions for the prevention of damage. Mr. French was recently requested by the Tasmanian Government to furnish a report on the supposed prevalence of a timber-boring beetle in Tasmanian hardwood. He made an extensive examination of the saw-mills, &c., of the island State, but found that the borer was confined to two or three timber-yards, where the timber infested had been some time on hand. In his report he made certain recommendations regarding the exportation of timber which should remove all grounds of complaint. The hon. secretary of the Institute, Mr. John Little, at the same meeting, gave an interesting account of his observations on the timber industry of Tasmania, and the uses of Tasmanian hardwood, in which he agreed with Mr. French's statement that the presence of the timber-boring beetle *Lyctus brunneus* is confined to a very small area. He was loud in his praise of the excellent use which is being made of local hardwood in ornamental fittings for public and other buildings.

Bird Day.—This year Bird Day will be celebrated in the State schools on Friday, 24th October, consequently the current number of the *School Paper* for the different grades of pupils is devoted to articles and extracts from authors' writings relating to birds. Each is well illustrated with pictures of our more interesting birds. Members willing to assist in bringing the claims of bird protection before the scholars of our schools should notify the head master of the school they are willing to address as early as possible.

The Victorian Naturalist.

Vol. XXX.—No. 7. NOVEMBER 6, 1913. No. 359.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Exhibition Building on Monday evening, 13th October, 1913.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 30 members and visitors were present.

CORRESPONDENCE.

From Mr. H. B. Slaney, hon. secretary "Bird Protection Court," requesting the Club to forward a letter to the Right Hon. the Secretary of State for the Colonies, through the Hon. the Premier, pointing out the vital necessity, in the economic interests of the Commonwealth, for the passing of the Plumage Bill now before the British House of Commons.

On the motion of Messrs. W. G. Mackintosh and F. G. A. Barnard, the matter was referred to the committee to deal with.

REPORTS.

A report of the excursion to Point Cook on Saturday, 13th September, was given by the leader, Dr. C. S. Sutton, who stated that the outing was poorly attended and the results did not call for any special mention.

A report of the excursion to Whittlesea on Saturday, 27th September, was given by the leader, Mr. F. G. A. Barnard, who reported an interesting day, notwithstanding the fact that the portion of the water reserves visited had been terribly damaged by the bush-fires of January last, and had not had time for recovery.

A report of the excursion to Cheltenham on Saturday, 11th October, was given by the leader, Mr. J. R. Tovey, who reported a fair attendance of members. The spring flowers were in evidence everywhere. The Wedding-bush, *Ricinocarpus pinifolius*, and the Myrrh Tea-tree, *Leptospermum myrsinoides*, were seen in all their glory. The Hairy Aotus, *Aotus villosa*, Grey Parrot-pea, *Dillwynia cinerascens*, Snow Beard-heath, *Leucopogon virgatus*, and Milkmaids, *Burchardia umbellata*, were seen in great profusion, whilst the Blue Squill, *Chamæscilla corymbosa*, looked charming amongst the grass and undergrowth. In a depression a large quantity of the Leafless Globe-pea, *Sphærolobium vimineum*, was observed. Of the Orchidaceæ, the Spider Orchid, *Caladenia Patersoni*, and the Flower of Sadness, *Lyperanthus nigricans*, were fairly abundant. Although the weather was at times showery, the ramble over the heathland was an enjoyable one.

A report of the junior excursion to Blackburn on Saturday, 4th October, was given by Dr. C. S. Sutton, one of the leaders, who said that the excursion was fairly well attended. The weather was fine, and about eighty plants were observed in flower. The best of these were *Chamæscilla corymbosa*, *Ranunculus lappaceus*, *Hibbertia stricta*, *Acacia armata*, and *Olearia stellulata*. *Prostanthera lasianthos* was found in plenty, growing in a small creek quite near to the station.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. R. A. Bastow, 575 Sydney-road, Brunswick, and Mr. R. R. Grundy, 455 Sydney-road, Brunswick, were elected ordinary members, and Mr. J. B. Gregson, Land Office, St. Arnaud, as a country member of the Club.

GENERAL BUSINESS.

There being only one nomination, Mr. F. Pitcher was declared duly elected as a vice-president of the Club.

Mr. P. R. H. St. John said that when journeying to the Yering Gorge on 25th September he had noted twenty-five set fishing-lines on the river-bank. The lines were all baited with magpies' heads and breasts, the dead magpies, minus their heads, being found along the banks. He had reported the matter to the district inspector under the *Fisheries and Game Act.*

PAPERS READ.

1. By Mr. F. Chapman, A.L.S., entitled "Notes on the Occurrence of the Cainozoic Shark (Carcharoides) in Victoria."

The author said that, of the many interesting palæontological links connecting the Patagonian strata of South America with the Victorian and South Australian deposits of Cainozoic age, not the least striking is this present occurrence of the teeth of two species of the shark referable to the genus Carcharoides, described by Dr. F. Ameghino in 1906. One of the species is new, whilst the other corresponds with Ameghino's *C. tortuserratus* The fact of this genus having hitherto been confined to the Patagonian beds, and now occurring in the well-known Waurn Ponds quarries, gives support to the opinion that both series formed parts of the same sea-bed. The Patagonian series has been regarded as of Lower Eocene age by Ameghino.

The description of the new species, *Carcharoides tenuidens*, was taken as read. The author's remarks were illustrated by diagrams, &c.

2. By Mr. G. V. Doyle, entitled "A Note on Parturition in Perameles" (communicated by Dr. T. S. Hall, D.Sc.)

The paper, being a technical one, was taken as read, and

referred to a specimen of a bandicoot, *Perameles obesula*, which had been forwarded to the University for examination, as the sender thought he had found evidence of communication between the uterus and the pouch; but a critical examination proved this not to be the case.

3. By Mr. J. C. Goudie, entitled "Notes on the Coleoptera of North-Western Victoria," Part V.

The author said that three families — viz., Silphidæ, Trichopterygidæ, and Scaphididæ—were unrepresented (or, at least, unrecorded) in the insect fauna of the Mallee. He found it difficult to account for the absence of some of these "missing links" from the entomological chain. For example, the species of an interesting blind genus, Rodwayia, of the Trichopterygidæ, are found abundantly both in Tasmania and New South Wales, where they occur as inquilines in the nests of several species of ants, one at least of which, *Ectatomma metallicum*, is evenly distributed over the Eyrean sub-region, of which this district forms a part. The author then dealt with the species he had collected of the families Histeridæ and Phalacridæ.

NATURAL HISTORY NOTES.

Mr. F. G. A. Barnard said that, whilst collecting specimens for the exhibition of wild-flowers in the Narre Warren district, a "rocking stone" had been pointed out to him. It is situated about two miles north of Narre Warren township. The bottom stone is about 10 feet high and 8 feet through, while the rocking stone is 15 feet long and 5 feet high, and weighs probably several tons. This is so well balanced that by exerting a little strength the stone may be rocked.

The president remarked that the committee should keep this interesting stone in mind, and arrange an excursion to the spot.

Mr. J. G. O'Donoghue said that he had been informed by a friend residing at Bacchus Marsh that when competing in a sparrow-shooting match in that town on 27th September he was much amused at the behaviour of a pair of "Laughing Jackasses." These birds stationed themselves in trees in close proximity to the traps, and on the sparrow falling dead or wounded at the discharge, they would immediately pounce down upon it and bear it away. So eager were they to secure the sparrow that on several occasions they almost beat the gun. Altogether, my friend considers the "Jacks" secured fully two dozen sparrows.

EXHIBITS.

The exhibits, which were confined to wild-flowers, are detailed on another page.

After the usual conversazione the meeting terminated.

EXHIBITION OF WILD-FLOWERS.

The annual exhibition of wild-flowers was held as usual in conjunction with the October meeting of the Club, but this year, at the request of the Victorian branch of the Australian Forests League, both were held at the Exhibition Building, during the currency of the All-Australian Exhibition. The dates arranged were Monday and Tuesday, 13th and 14th October, and, mainly through the efforts of Dr. Sutton, contributions of flowers were received from many country correspondents, while Mr. J. Gabriel's aid in the preparation of the show tables was invaluable. The display was a very fine one, and created considerable interest among the visitors to the Exhibition who were unacquainted with the Club's annual display.

As usual, the Director of the Melbourne Botanic Gardens, Mr. J. Cronin, forwarded a fine display of cut blooms of Australian plants, shrubs, &c., among which may be mentioned :— Twenty-eight Victorian species, including *Clematis aristata*, var. *Dennisæ*, Pink Clematis ; *Calythrix Sullivani*, Graceful Fringe-Myrtle ; and *Prostanthera rotundifolia*, Round-leaved Mint-bush ; and twenty-three Australian species, among which were *Boronia elatior*, Tall Boronia ; *Doryanthes excelsa*, N.S.W. Spear Lily ; *Chorizema cordatum*, Flame Pea-bush ; and *Telopea speciosissima*, N.S.W. Waratah.

Mr. A. Rutter Clarke also forwarded about fifty cut blooms of Australian plants grown in his garden at Toorak : among these were *Grevillea asplenifolia*, *A. oleoides*, *Hibiscus Huegelii*, *Banksia ericifolia*, *Verticordia Brownii*, *Acacia Macredemia*, *Prostanthera scabra*, *Anigozanthos Mangellsii*, and *Kennedya nigricans*.

Other exhibits were made as follows :—

By Messrs. J. W. Audas and E. E. Pescott.—About 50 species from Beaconsfield and Emerald, including *Bauera rubioides* (white), *Platylobium formosum*, *Sphærolobium vimineum*, *Pultenæa villosa*, *Epacris microphylla*, *Eriostemon correifolius*, *Pimelea octophylla*, *Acacia tenuifolia*, *Prasophyllum elatum*, *Thelymitra aristata*, *T. flexuosa*, *Caladenia Menziesii*, and *Restio tetraphyllus*.

By Messrs. F. G. A. Barnard and B. L. Stanton.—About fifty species from Narre Warren, Paradise, and Emerald, including *Utricularia dichotoma*, *Polypompholyx tenella*, *Epacris obtusifolia*, *Sprengelia incarnata*, *Pultenæa villosa*, *Dillwynia subumbellata*, *D. floribunda*, *D. ericifolia*, *D. cinerascens*, *Glossodia major*, *Caladenia suaveolens*, *Diplarrhena moræa*, and *Eriostemon correifolius*.

By Messrs. Coghill, O'Donoghue, and Sutton.—About sixty species from Wright and Cockatoo Creek, including *Tetratheca*

ciliata (white), *Bauera rubioides* (white), *Banksia collina*, *Eriostemon correifolius* (pale), *Kennedya prostrata*, *Pimelea flava*, *Comesperma volubile*, and *Pultenæa scabra*.

By Mr. J. D'Alton.—About fifty species from Hall's Gap, Grampians, including *Boronia pilosa*, *Bæckea plicata*, *Calectasia cyanea*, *Pimelea axiflora*, *Astroloma conostephnoides*, *Dillwynia floribunda*, and *Grevillea alpina*.

By Mr. St. Eloy D'Alton.—About forty species from Dimboola, including *Lhotzkya genetylloides*, *Prostanthera coccinea*, *Eriostemon lepidotus*, and *Halgania cyanea*.

By Messrs. Hamilton and Mackintosh.—About twenty species from St. Helena (Greensborough), including *Helichrysum obcordatum*, *Pultenæa daphnoides*, *Daviesia corymbosa*, and *Stackhousia linarifolia*.

By Mr. R. Kelly.—About 100 species from Healesville, including *Epacris impressa*, *Grevillea alpina*, *Bæckea diffusa*, *Tecoma australis*, *Hardenbergia monophylla*, *Bauera rubioides*, *Acacia leprosa*, *Xanthorrhœa australis* (10 feet high), *Dillwynia cinerascens*, *D. floribunda*, and *Daviesia ulicina* (yellow).

By Rev. A. H. Mitchell.—About twenty species from Traralgon.

By Mr. J. P. M'Lennan.—About twelve species from Warragul, including *Bauera rubioides*.

By Mr. D. J. Paton.—About twenty species from Bendigo, including *Eriostemon obovalis*.

By Mrs. Parks.—About thirty species from Grantville, including *Utricularia dichotoma*, *Caladenia carnea*, *C. Menziesii*, *Comesperma ericinum*, and *Styphelia Richea*.

By Mr. J. R. Tovey.—About thirty species from Mentone, including *Euphrasia collina*, *Correa speciosa*, var. *normalis*, *Ricinocarpus pinifolius*, *Lyperanthus nigricans*, *Dianella revoluta*, *Burchardia umbellata*, and *Leptorrhynchus squamatus*.

By Mrs. G. H. Wise.—About 25 species from Sale, including *Correa speciosa* (red), *Boronia polygalifolia*, *Ricinocarpus pinifolius*, *Leucopogon ericoides*, *Pultenæa floribunda* and yellow variety.

By Mr. F. Wisewould.—About sixty species from South Gembrook, including *Tetratheca ciliata*, *Daviesia corymbosa*, *Melaleuca squarrosa*, *Sphærolobium vimineum*, *Glossodia major*, &c.

Flowers were forwarded by head teachers of State schools as follows, the most notable species only being recorded:—Bonnie Doon, *Bulbine bulbosa*; Barnawartha, *Grevillea lanigera*, *Podolepis acuminata*, *Gompholobium Huegelii*; Elphinstone, *Eriostemon obovalis*, *Kennedya prostrata*, *Stackhousia linarifolia*; Glenrowan, *Swainsona procumbens*, *Styphelia virgata*, *Diuris punctata*; Lang Lang; Longwood, *Brunonia australis*,

Helichrysum scorpioides, Pultenæa humilis, Micranthera hexandra, Caladenia Patersoni; Diapur, *Halgania cyanea, Westringia rigida, Podolepis acuminata*; Trafalgar; Lindenow; Upper Moondara; Rokeby; Moe.

EXCURSION TO POINT COOK.

It was not expected that Point Cook, situated on Port Phillip, about midway between Williamstown and the mouth of the Werribee, would attract a large gathering, as the locality is flat and not particularly interesting; but, as all directions round the metropolis should be visited from time to time, it was put down for Saturday, 13th August, but only the leader and another member left town by the mid-day train for Laverton (Geelong line), from whence the Point is distant some six miles. Setting out in a southerly direction over the plain, the most noticeable flowers were *Velleya paradoxa, Stackhousia linarifolia*, and *Leptorrhynchus squamatus*. Larks (whether English or Horsfield's Bush-Lark could not be decided) were singing gaily everywhere. Passing through a portion of the Werribee Closer Settlement Irrigation Area, we skirted a swamp, where were many dead spikes of *Plagianthus spicatus*, the plants themselves just starting into growth for the new season. Presently, on a slope, fine plants of *Kennedya prostrata* in full bloom were unexpectedly found. Making for a grove of trees in a depression, these were found to be Red Gums, *Eucalyptus rostrata*. A little further on a wide stretch of bracken, containing no other growth, was passed through, which was found to extend right down to high-water mark. Lunch was taken on the seashore, and large heaps of shells turned over, in which *Nasca fasciata* (the Club's badge) and other interesting species occurred. Passing round the homestead on the Point, our way was now northerly towards the creek known as the Skeleton Waterholes, which proved a barrier to our progress, being fringed with swampy country carrying a strong growth of the salt-bush, *Salicornia arbuscula*. A fine *Bursaria spinosa*, with a trunk at least 18 inches through, was seen, also signs of aboriginal kitchen middens; these, however, are more numerous towards Altona. Quantities of the singular Horned Poppy, *Glaucium flavum*, Crantz, an introduced plant with brilliant yellow flowers, grow along the shore. On the shore of some brackish-water lagoons thousands of small univalve shells, *Coxiella confusa*, E. A. Smith, were noticed. The weather was not of the best, but still enjoyable, and the locality is one which would seem to be worth visiting at some other season.—C. S. Sutton.

EXCURSION TO WHITTLESEA.

Whittlesea, though little further from town than Ferntree Gully, owing to its limited train service requires a whole day for a visit; consequently, when the leader found five others, including two ladies, at Spencer-street station on Saturday morning, 27th September, he felt amply repaid for the effort it was necessary for all to make to reach the meeting-place at a somewhat early hour. The rich alluvial flats in the immediate vicinity of Whittlesea are not promising to the naturalist; but three miles away one begins to reach the foothills of the Plenty Ranges, where, as our outing proved, the bird-lover or the botanist can always find something of interest. We had arranged to visit the Toorourrong Reservoir and the adjacent valley of Jack's Creek, which, being within the reservation of the Metropolitan Board of Works, are forbidden ground unless visitors are provided with the permit courteously granted by the Board on request. A vehicle had been arranged for so as to save the three-mile walk to and from the entrance gate. Here we got the first indication of what we were destined to see many signs of during the day—the devastating fires which swept through the reserve last January. The exotic trees at the entrance suffered so severely that they have had to be removed and new ones planted. A visit was first of all made to the lake, the surroundings of which, fortunately, seemed to have escaped the fire fiend. Those who had not seen it before could not but express their delight at the beauty of its situation, nestling amidst a setting of deep-blue hills, and promised themselves another glimpse in the subdued light of the evening; but we lingered so long in other places that there was no time for a second impression. The Jack's Creek valley was now our objective, and while the fires, no doubt, did much damage, which will require years to re-clothe, the clearance doubtless helped the smaller plants, and we were gratified to find numbers of such orchids as *Caladenia carnea*, *C. congesta*, and *C. Menziesii* where previously had been under shrubs, while in one place the larger violet, *Viola betonicifolia*, formed quite a bank of flowers. Fortunately, in places the track still wound through bush untouched by fire, and we were enabled to conceive what the hillside was like before the calamity happened. The native laburnum, *Goodia lotifolia*, and the Austral Indigo, *Indigofera australis*, added colour to the scene, but we were a little too late for the acacias, of which several species fringe the track. Here and there the Pultenæas, *P. scabra* and *P. Gunnii*, with *Daviesia ulicina*, showed a few of their characteristic brown and orange pea-flowers, but they, too, had suffered severely. At Smith's Gully, the shady resting-place at the foot of the final hill, we

found the scene almost heart-breaking. Many of the fine silver wattles are completely killed, and the King Ferns, *Todea barbara*, reduced to stumps; however, the latter will probably renew their graceful fronds in the course of a few weeks. The foot-track along the creek, which starts just here, instead of being a mere pathway between the shrubs, was entirely open, and presented a scene of devastation on either side. The huge tree-ferns in the bed of the creek were so many blackened stems, but fortunately in many instances new fronds were just making their crozier-like appearance, so that in the course of a few weeks they will have something of their former glory. The beautiful *Eriostemon correifolius*, usually found here, was quite burnt out, but we saw it later on near the main track. Again we found patches of unharmed country, so that visitors can still get some idea of what the wealth of vegetation in the valley was like before the fire occurred. The Minnie Falls thundered louder than ever, as an extra quantity of water seemed to be coming down the creek for the replenishment of the Yan Yean, some ten miles away. The natural setting of the foot of the Cascades also escaped the fire, but the fine bushes of *Grevillea alpina*, fully six feet high, which grew near the summit of the path alongside the channel have been swept away, and, as is often the result, will probably be replaced in a short time by a tangle of bracken. Leaving the ladies here to rest awhile, the others pushed on for about a mile along the aqueduct towards Wallaby Creek, still finding signs of the fire in many places, but being rewarded by the sight of some Silver Wattles, *Acacia dealbata*, still in full bloom, while deep down in a gully a lyre-bird was heard, and an endeavour made to coax it into view. Other species heard, but not seen, were the Coachwhip and Pilot birds. During the day about thirty species of birds were seen, including the Black Cockatoo, Olive-backed Oriole, Pink, Scarlet, and Yellow Robins, White-eared Honey-eater, and White-fronted Heron. Returning down the hill towards the Smith's Gully bridge through more devastation, we at last came to a bit of unburnt country, where we were able to get nice bunches of Grevillea, Tetratheca, Eriostemon, &c., as evidence of the veritable flower-garden the reserve used to be. If there is any truth in the statement that it requires a fire to make the larger Grass-tree, *Xanthorrhœa australis*, flower, then there is ample proof at Toorourrong, for hundreds of baby flower-spikes, from twelve to thirty inches in height, were appearing on the hillside. A large variety of the usual bush flowers was seen, and, in addition, several which are somewhat rare, such as *Drosera Menziesii*, *Marianthus procumbens*, and *Tetratheca pilosa*, var. *rubœoides*. During the day no less than fourteen

species of eucalypts were seen, among them being *E. elæophora*, *E. dives*, *E. rubida*, *E. paludosa*, and *E. coriacea*, and, thanks to the fires, we were able to collect a number of seedlings of the different species. Some specimens of a very singular fungus, *Morchella conica*, Pers., figured by Dr. Cooke in his "Handbook of Australian Fungi," were found alongside the foot-track near its commencement, but they quickly shrivelled up to very small dimensions. Our driver awaited our return at the entrance, and we were soon back at Whittlesea, where tea was taken before taking train for town. The weather was all that could be desired, and none regretted the outing, though somewhat marred by the sight of blackened trunks and withered shrubs.—F. G. A. Barnard.

OBSERVATIONS ON THE FUNCTION OF ACACIA LEAF GLANDS

By Reginald Kelly.

(*Read before the Field Naturalists' Club of Victoria, 11th Aug.*, 1913.)

In the *Victorian Naturalist* for June, 1912 (vol. xxix., p. 26)' is an interesting article carefully written and illustrated by Mr. A. D. Hardy, F.L.S., on "The Distribution of Leaf Glands in Some Victorian Acacias." On reading this, the question one naturally asks is, "What is the function of these so-called glands?" and impliedly also, "Are they glands?" The paper professes only to deal with situation, not function, and one searches anxiously for a clue to their use, and wonders if the situation has any relation to function or its history. There is one reference only that appears at first sight to have any bearing on this question, and from that I first began my investigation. That reference is to the nerve connecting the midrib with the gland. Now, a nerve connecting with this knot or gland suggests, first, a true nerve, and inferentially a ganglionic function. Investigation shows, however, that this alleged nerve is nothing more nor less than a strand of tissue of the same nature as the midrib itself, and is a "nerve" only by virtue—or, rather, by the vice—of loose botanical expression. In botany, nerves, veins, and ribs are synonymous terms, or at best only differentiated in their order of thickness. When we remember that botany is a biological subject, and that these three terms are, biologically, widely distinct and functionally definite, the conclusion is forced on us that we cannot speak or think in biological terms on this division of the subject. It is high time that botanists found other terms to replace "nerves" and "veins," if not ribs. It is plain that the gland is not a nervous centre; the "nerve" is not a line of com-

munication — not, in fact, a nerve; nor is it attached to responsive contractile tissue. Having quarrelled with this terminology, I began to have my doubts as to other terms, and the next was "gland." I doubted whether these excrescences were glands at all. To satisfy myself on this I have searched through many books and examined many species of acacia, and these peculiar structures *in situ* and in section with lens and microscope. Before I had examined half the number of species mentioned and figured by Mr. Hardy I was impressed with his patience and accuracy, and was surprised also to find that in Strasburger (4th Eng. ed., 1912) there is no mention of glands in respect of these or any other plants, and the word is not even indexed. It is still more interesting to find on page 168, figure 174, depicted a seedling of *Acacia pycnantha* with phyllodes bearing nectaries. These "nectaries" are undoubtedly identical with the glands, and the word "nectary" is more confirmative of a gland-like nature than even gland itself. The term is usually associated with the flower, but there are undoubtedly leaf nectaries. These are distinguished by some authors by the term "extra-floral nectaries." Prior to seeing this illustration, I was firmly of the opinion that, whatever the function when on leaves, they were mere survivals, obsolete and functionless, on phyllodes. I then went in search of facts, and in the large number of glands examined could not find, even with the microscope, any secretion of a nectar or liquid nature. Uncut, they appeared to be firm, hollow, warty excrescences, with a central aperture protected by fine hairs. Sectionally examined, the cavity was empty, with a hard, dry, inner wall, hung with most beautiful, minute crystals—a veritable stalactite cavern. The material was fresh from the trees, but these were not in flower. The only acacia I could find in bloom then (March) was the Natal Wattle, *Acacia Natalitia*, a pinnate-leaved species bearing a glandulous growth between each pair of pinnæ. In none of this species could I find any nectar, and the best in that respect that can be said of these glands is that they were more succulent or less dry, and more warty in appearance, than those of other species. It is significant that, in keeping with what Mr. Hardy says—viz., that these growths appear early in the development of the leaf—they also become hard and shrunken as the leaves become older, and brown, red, or purplish, approximating to the colour of wattle-bark, and practically dead in the oldest leaves. This fact may indicate that the gland, or the organ of which it may be only a relic, belongs to a comparatively early stage of the race history of the genus. Whatever its function, it is active only in the first two seasons, possibly only in the first. Another fact is that in pinnate leaves the glands

lie along the midrib immediately below the flowering spike or raceme, and in phyllodes on the edge in a corresponding position —*e.g.*, *Acacia melanoxylon*, *Acacia pycnantha*, *Acacia penninervis*, *Acacia cultriformis*—and at any rate in those with only one head on a peduncle the flower-head deflects laterally from this position in fertilization. Is this position merely an insignificant coincidence ?

The flowers of *Acacia dealbata* and *Acacia Natalitia* lie more obliquely above the leaf. A few glands were lined with a fine cobwebby substance, such as forms the cocoon of some insects. Many of the tender ones appeared to be bitten by an insect, but so also did the pulvinus and the pinnæ ; but I could find no cases of this biting in any glands on the leaves below a flower-head of *Acacia Natalitia*, whether deflected or not, yet these were apparently more tender and edible. I may here note that in *Acacia melanoxylon*, bearing both phyllodes and pinnate leaves, and also the leaf combining both phyllodes and pinnæ, the gland was situated always on the phyllode and never on the rachis of the leaf, unless that rachis were well extended laterally, and then only on the outer edge. No physical interference with the leaves, glands, or pulvinus was productive of leaf-sleep in Australian species, but severance of the leaf, and even touch, caused the pinnæ of several African species to close almost immediately, yet nothing indicated definitely that the gland had any part in this.

There were in my mind during the pursuit of these inquiries several theories as to function. The first, that they may be ganglia, has been practically disposed of ; suffice it further to say that the pulvinus or thickening at the base of the petiole, so general in leguminous plants, has some of the characteristics of nerve-controlled tissue, and its function is generally supposed to be the control of leaf-sleep. If this function is exercised by the pulvinus, why not by the glands ? This proposition is partly answered by the fact that other plants, such as Robinia, have no glands, and are controlled sufficiently by the pulvinus. We have, as far as I have been able to discover, no adequate explanation of the action of the pulvinus—how it acts, nor what conveys to the contractile tissue the stimulus of light, heat, cold, or other shock. That there are sensitive plants, such as *Mimosa pudica* and the Stylideæ (trigger-plants), is certain ; but, as to their nervous character, the knowledge seems to be quite empirical. There is no certainty that sensitiveness of plants is of a nervous nature, nor, if so, where nervelessness in plants merges into nervousness, nor whether this latter character in any way approximates to the elemental nerve system in animals. Under these circumstances, it is difficult to pursue that theory further, but the probability may be dis-

missed, in view of the fact that nature would scarcely duplicate structures for the one office, and of the further fact that glands in pinnate leaves would be limited to the control of the pinnæ between which they are situate, and that in many species and individuals there are pinnæ with no glands to control them, and that in phyllodes this use would be vacated.

The further theories which required consideration were :— Are these structures—(*a*) stomatoid growths, (*b*) assimilative organs, (*c*) stipular growths, (*d*) symbiotic organs, (*e*) fertilizing aids, (*f*) protective aids ? That these may, in the main, be considered together, I will quote the only passage that I have been able to discover in any authority directly bearing on the subject—viz., Solereder (Solereder, "Systematic Anatomy of Dicots.," Boodle and Fritsch, vol. i., page 296, 1908) : — "Rather large peltate or wart-like masses of tissue occur on the petiole of most Mimoseæ. These are visible even with the naked eye, have secretory functions, and, as they are easily observed, have already been described by systematists (see Delpino). Without dealing more fully with the diverse structural features of these petiolar glands, it need only be stated here that they consist of a parenchymatous group of cells below which bundle-terminations, with abundant deposition of crystals in the surrounding tissue, usually occur. They are occasionally (in the acacias possessing phyllodes) reduced to glandular spots, and sometimes excrete a sap containing sugar." I have not had the advantage of seeing Delpino's work, nor any further comments thereon nor extracts therefrom.

Regarding the stomatoid growths, the only relation that can be suggested is that, as acacias have practised economy of transpiration and the retention of moisture over long periods, the restriction of evaporation has caused an accumulation of deposit in the form of sugar or other crystals. This, in the coarser portion of the plant, is exuded as gum, and in the leaves through these glands, and by pores on the leaves for cleaning the finer cuticle. This residuum is found in the crystals of the glands and the waxy deposit on the leaves ; in the last case, at least, being put to an economical protective use, making cause and effect serve the same or aid the one purpose. This would point to the so-called glands being excretory organs. In this capacity they would also have in one sense assimilative functions, in being clearing-houses of excess substances. The last two stages of this form of excretion of residuum does not take place, and is unnecessary, in gum-yielding, deciduous trees, such as the common cherry. These growths are only analogically stipular, and are rudimentary relics. This theory in no way, however, affects their present function, but is historical

only. We may also dismiss any suggestion as to these papillæ being embryonic cells. This may be disproved by unsuitability of the tissue, and by the fact that, although acacias grow on river-banks and the leaves fall in mud and other places suitable for germination, no growth from them has ever been recorded. With this my own experiments, conducted on the assumption that everything is possible, have agreed.

The three theories—symbiosis, fertilizing, and protective—may be considered together, as either a fertilizing or protective agency in this case would be intimately connected with insects, and the symbiotic relation would be between the insects and the plant. With a powerful lens no insect life can be observed on the gland, nor in the cavity, even when opened by transverse section. It might here be mentioned that the entrance to the gland is very minute and (except in *A. pycnantha* and *A. penninervis*) protected by fine hairs, which, in addition to other potentialities, prevent the access of water. The opening in the pinnate species is generally roundish, but varies in different species to diamond and triangular shapes. The inside of the excrescence is hollowed out. In the large-leaved species, such as *Acacia pycnantha* and *Acacia penninervis*, the cavity is longitudinal, and almost closed up as if drawn lengthwise and compressed in the process of rachis expansion. In *A. pycnantha* the hollow of the gland is extended longitudinally in the edge of the phyllode, and in it the crystals darken with age; then the glands turn brown. In these are no visible insects; and inside the hollow of *A. penninervis* the microscope discloses a comparatively long green spike like a pistil with a knob on the end. This spike projects from the side towards the centre of the cavity, and extends nearly its whole diameter. Of many species that I have examined, I have found insect life only in two—*Acacia Baileyana* and *Acacia dealbata*—and this only by the aid of the microscope. They are extremely tiny creatures, the identification of which rests with entomologists. Most that I have observed are quite white and very active; some are brown, and appear to colour with the discoloration of their surroundings. I incline to the opinion that the colouration of insects to suit their surroundings must be derived from those surroundings, and that the colour of these insects is derived from their food supply. They become darker as their food does. They run in and about the crystals like people in streets. These insects are extremely difficult to dislodge, and, being visible only under the microscope, it is a work of art to get one for mounting. I have, so far, been unable to trace their life-history, except that on the crystals and the hairs outside I have found hanging their moulted skins. I found the insects first in March of this year; in April they

were rarer. That they emerge from their houses is evident, for the outside white coating has been eaten off the gland, and some of the adjacent leaflets. It is at the bitten spots in both instances that the purple colouring and hardening, amounting to lignification, sets in. When this occurs the insect strikes camp. I do not imagine for a moment that the acacias grow these houses for the purpose of accommodating the insects, nor that charity is one of the attributes of plants. They, like every other form of life, are essentially selfish. Nor do they secrete delicacies for these insects; for whatever they secrete or exude they do for economic purposes and not benevolence. The large hollow thorns of *Acacia cornigera*, which are said to be inhabited by ants, are regarded as symbiotic structures, and it is generally accepted that mutual services are rendered by insects and plants. Some extra-Australian species are said to secrete sugary substance in their hollow thorns, and it is conceivable that the glands in our species are corresponding features aborted or modified. That insects only make use of them, taking them as they find them, is the more acceptable conclusion, until it can be shown that the organ is the common meeting-ground of the symbionts — that each one, if not essential, is at least beneficial to the other. Of this there is very little evidence. Most of the evidence is the other way. In the first place, it seems that only some of the glands are inhabited; some are almost solid. The insects are only in occupation at certain seasons. Many of the glands excrete their contents in the form of a floccous cap, which evidently loosens and falls away. The insects, if, indeed, they remove the secretion at all, certainly feed upon the tissue of the gland and devitalize it. It is possible that the insect is injurious to the plant. It may be accepted as a fact that the plant is useful to the insect, but that there is no community of service. There is no evidence that the insect is a symbiont by virtue of any protection it affords; that there is any insect that it wards off, or that it could do so; or that, if it could, that the insect warded off would be any more injurious or less beneficial to the plant. There is no evidence that the insect is a fertilizing agent, or that the plant is entomophilous and not anemophilous, or that this insect is capable of fertilizing flowers. It is more in keeping with my observation that it feeds upon the unopened flower-heads, and in this way is an enemy rather than a friend. At the same time it is probable that the insects are of some, if not great, value in keeping these organs clear of matter, with which they would otherwise be clogged. This service is doubtful, but, if real, would be some indication of symbiosis. I come to the conclusion that these organs perform excretory functions, and are capable of per-

forming them without outside aid—that they are not, strictly speaking, glands or nectaries, or, in other words, the terms gland and nectary do not accurately describe the nature of the growth. The secretions are neither fluid nor viscid. Some of the organs I examined were filled with a ball of orange-coloured jelly, which, I believe, is the sac containing eggs or insect embryos. These so-called glands (for which I suggest the name "vents") in other forms may, in the earliest history of the genus, have performed other functions and be now but reduced substitutes, or even aborted or non-developed stipules, whose work could be (and often is) otherwise performed. In the phyllode they are mere relics—not yet altogether but almost obliterated, and now functionless. As to the voluntary—or what in plants is believed by many to approximate to voluntary—accommodation by them of insects, I enjoy a delightful scepticism, which I should rejoice to destroy or confirm.

ON A NEW VARIETY OF *EUCALYPTUS GLOBULUS*—*E. GLOBULUS*, VAR. *ST. JOHNI.*

By R. T. Baker, F.L.S., Curator Technological Museum, Sydney.

(Communicated by P. R. H. St. John.)

(*Read before the Field Naturalists' Club of Victoria, 11th Aug.*, 1913.)

The Blue Gum, *Eucalyptus globulus*, Labill., has such an extensive range from southern Tasmania through Victoria to the north of New South Wales, and preserves such a constancy of general morphological characters, that a departure from the normal is of systematic interest; and the honour is due to a Victorian for unearthing this variety. It was discovered by Mr. P. R. H. St. John on the banks of the Lerderderg River, Bacchus Marsh district, 5th November, 1903, so that at present its location is restricted: but this appears to be the general rule when new species or varieties are discovered. At least a hundred similar trees are growing in the neighbourhood, and there is little doubt but that it will be found to be more widely distributed later on.*

The other species of eucalypts growing within a square mile of this particular tree are as follows:—*E. amygdalina*, *E. Behriana*, *E. elæophora*, *E. leucoxylon*, *E. melliodora*, *E. macrorrhyncha*, *E. hemiphloia*, *E. polyanthemos*, *E. sideroxylon*, *E. viminalis.*

The material collected by Mr. St. John is quite complete, consisting of (*a*) seedling; (*b*) adventitious shoots, obtained from branch of tree 8 feet from the ground, the tree about

* This variety has since been discovered in South and East Gippsland. —R. T. B.

20 years old ; (*c*) leaves from a young tree 6 feet high ; (*d*) leaves from young tree 12 feet high ; (*e*) twig from mature tree, with early buds, mature buds, and flowers ; (*f*) twig with fruits from mature tree. The young seedlings have ovate-lanceolar, acuminate, petiolate leaves, glaucous above, under surface purplish ; the cotyledons or seed-lobes are on slender stalks, and deeply bi-lobed.

(*a*).—The older seedling leaves are oval, sessile, or shortly petiolate, and slightly or not at all cordate ; shortly acuminate ; not large, about 1½ inches to 2 inches long, and ¾ inch to 1¼ inches or more wide ; pale and glaucous on the under side, oil-dots numerous, stem terete, branchlets square.

(*b*).—Similar in shape to those of (*a*), only longer.

(*c*).—The leaves of the adventitious shoots are longer, orbicular, cordate, lateral veins slightly oblique, parallel, and looping some distance from the edge ; branchlets rectangular.

(*d*).—These are large, petiolate, oval to oval-lanceolate, showing intermediate stage to normal leaves.

(*e*).—This is an interesting specimen, as it shows the inflorescence in every stage. The early stages are characterized by a calyptra, covering two or three buds. The mature buds are more like those of *E. Maideni* than *E. globulus*, and differ from the latter in the absence of a second operculum. The calyx is compressed, sessile, about ¼-inch long, ¼-inch and less in width, operculum acuminate, depressed, tuberculate, stamens inflexed before expansion ; anthers parallel, opening by longitudinal slits.

Normal leaves lanceolate, falcate, as in the type, with similar venation, 2 inches to 2 feet or more in length, ½ inch to 3 inches broad, on petioles varying from 1 inch to 2 inches long ; oil-dots conspicuous.

The fruits of this variety differ considerably in size and other features from the type ; they measure about ¼ inch long to ½ inch in diameter.

The edges of the compressed calyx are here seen to have developed into slightly broken ridges ; there is quite an absence of the tubercules so pronounced a feature on the type ; the rim is sharp and well defined, and slopes down or upwards to the summit of the valves, that vary in number from two to four.

It is the seedling leaves, the presence of a calyptra in the early buds, the absence of double opercula, and the fruits which justify, in my opinion, the tree being given varietal rank.

The accompanying plate shows a series of typical "carpels," or "fruits," reduced to one-half their natural size. The specimen marked A was grown in America.

PLATE VII.

Eucalyptus globulus variety St. John

Eucalyptus globulus (typical forms)

The Victorian Naturalist.

Vol. XXX.—No. 8. DECEMBER 4, 1913. No. 360.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 10th November, 1913.

In the absence of the president, Dr. C. S. Sutton, one of the vice-presidents, occupied the chair, and about 60 members and visitors were present.

REPORTS.

A report of the excursion to Alphington on Saturday, 18th October, was given by the leader, Mr. J. Searle, who said that the attendance was rather small, the threatening aspect of the sky doubtless deterring members from joining, but any fears regarding the weather were groundless, for the afternoon, though at times overcast and gloomy, kept fine. The water in the ponds was teeming with aquatic life—vegetable as well as animal—and the party was soon busy at work filling tubes, &c.. and discussing the various items of interest that came under their notice. The genus Brunella is recorded for the first time from these ponds, two species, *B. viridis* and *B. longicornis*, being taken. Entomostraca were especially numerous, and amongst the dozen species of Copepoda secured the most conspicuous in point of numbers was the species recorded as new on the Club's excursion to these ponds in October, 1912, and, though not yet described as such, it has been known for some time to collectors as *Boeckella asymmetrica*, and is a well-defined species. After securing from the ponds sufficient material for home study, attention was turned to some logs lying near the river-bank, under which were found Isopods of several genera, which are commonly called "woodlice" or "slaters." Altogether, a pleasant and instructive afternoon was spent.

A report of the excursion to Ringwood on Saturday, 25th October, was, in the absence of the leader, Dr. J. A. Leach, given by Mr. W. J. Stephen, who said that eight members took part in the excursion, and an enjoyable afternoon was spent. Thirty-one species of birds were noted during the outing, and he considered the locality one of the best in the neighbourhood of Melbourne for studying bird-life.

A report of the excursion to Werribee Gorge on Tuesday, 4th November (Cup Day), was given by the leader, Mr. A. L. Scott, who said that nineteen members and friends participated in the excursion. Though the weather was very cold and

showery, and a couple of snow-storms were experienced, a most enjoyable and interesting day was spent.

In reporting the doings on the occasion of the social afternoon at the Botanical Gardens on Saturday, 8th November, Mr. F. Pitcher said that about forty members and friends met at the office entrance at the appointed time. Attention was called to the oaks on the Oak Lawn, which were in splendid foliage, and after a ramble through the gardens the party assembled at the tea-house, where they were joined by other members and friends, bringing up the total to fifty-three. The whole party then sat down to afternoon tea as the guests of the committee. Dr. T. S. Hall, as one of the guests, said he desired to express his thanks to the committee for their kindness, and thought that the method of spending the afternoon was one that might be tried again.

A report of the junior excursion to Beaumaris on Saturday, 1st November, was given by the leader, Mr. A. L. Scott, who said that six members were present. The day was ideal for such a trip, but, as is always the case when an excursion goes so far afield, the time at their disposal was limited. The best localities for fossils were inaccessible, owing to the tide being in, so that the excursion became less geological than on former occasions. The general history of a fossil was lightly touched on, and various objects of interest found on the beach—concretions, shells, &c.—were dealt with.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. Edward S. Anthony, 86 Railway-parade, Northcote, Mr. E. H. Kinnear, 18 Aberfeldie-street, Essendon, Mr. Leslie Parker, 19 Mackenzie-street, Melbourne, and Mr. Geo. P. Townend, Logie-street, Oakleigh, were duly elected ordinary members, and Mr. A. M'Callum, Colac, a country member of the Club.

GENERAL BUSINESS.

Mr. F. Pitcher said he was unavoidably absent from the last ordinary meeting of the Club, when he was elected to fill the vacant vice-presidentship; he therefore took the opportunity of thanking the members for the honour that they had conferred on him.

The chairman announced that Mr. P. R. H. St. John had been chosen by the committee to fill the vacancy in the committee caused by the election of Mr. F. Pitcher as a vice-president.

CHRISTMAS EXCURSION.

The chairman said that Mr. J. T. Hamilton, F.L.S., who had

been endeavouring to arrange for an excursion to Mallacoota during the Christmas holidays, reports that it is impossible to get a steamer at that time, and asked for suggestions as to any other locality.

Mr. J. Shepherd suggested another visit to Wilson's Promontory, and said he thought it advisable to bring the locality before the public as often as possible.

Mr. G. Coghill said that if a leader could be obtained an excursion to the National Park could be easily arranged.

Mr. Barnard suggested the Marysville district. It was an interesting locality, and had been opened up greatly during the past few months.

Mr. W. Rosenhain said that if it were possible to hold the excursion to Mallacoota it should be done. He understood that the locality was soon to be thrown open to timber-cutters, when much of its charm would be destroyed.

The chairman said that the committee would consider the suggestions.

PAPER READ.

By Mr. R. A. Bastow, entitled "Australian Lichens."

The author remarked on the various forms and shapes assumed by the plants known as lichens, which by some botanists are regarded as a union of fungus and alga, though he preferred to treat them as a distinct group. By means of blackboard drawings he pointed out the method of reproduction and growth, and gave some hints on their collection and classification. He handed in for publication a complete illustrated synopsis of the genera of Australian lichens.

The chairman said that the author's remarks were very interesting, and the paper should draw attention to a group of plants in which there were at present very few workers.

Mr. G. Coghill remarked that the author had drawn a considerable number of artistic illustrations on the blackboard, but had not referred to all of them. He suggested that, as the paper had created considerable interest, Mr. Bastow should explain the whole of the drawings. With this the author readily complied.

Mr. F. G. A. Barnard said the thanks of the Club were due to Mr. Bastow for his valuable paper on the lichens, and trusted that he would be able to find the time to prepare a similar paper on the mosses, on which he was an acknowledged authority.

Mr. A. D. Hardy, F.L.S., said that Mr. Bastow had a few years ago prepared a "Key to the Marine Algæ," which was of great assistance to workers in that group.

Mr. Bastow, in reply, said he was always glad to assist those desirous of studying lichens, mosses, or seaweeds.

NATURAL HISTORY NOTES.

BEES AND POLLEN.—Mr. J. Searle said that the statement is put forward, he believed by Grant Allen, and frequently made use of by other writers of "popular natural history," that bees, when collecting pollen, visit only one kind of flower, or flowers of the same family, the reason for this being stated to be that pollen grains of one shape or size are more readily packed in the "pollen baskets" on the legs of the bee than pollen of various shapes. He recently had an opportunity of testing this statement, when it seemed to fall to the ground. The insect was one of our native bees, and it visited first tea-tree, then dandelion, and many other wild flowers—white, yellow, purple, or blue—in no particular order, but just as they happened to be met with. After five minutes' observation he captured the insect on a dandelion flower, and took it home. After washing the pollen off the insect's legs with a little alcohol, he placed a portion of it on a glass slip under the microscope, and counted thirteen different shapes among the pollen grains — round, three-cornered, oblong-oval, kidney-shaped, and spiked. Evidently this bee's education had been sadly neglected, or it would not have made such a varied collection of pollen; or was it that the writers of these "popular natural histories" were at fault? Perhaps they had never seen a bee at work, but had written a pretty fable on what they thought the bee ought to do.

Mr. A. D. Hardy, F.L.S., said that in his opinion the wild bee collected more promiscuously than the hive bee.

EXHIBITS.

By Mr. J. W. Audas, F.L.S.—Fresh specimens of orchid *Caleana major*, R. Br., and also fifty dried specimens of plants collected at the Grampian Mountains, October, 1913, including *Prostanthera debilis*, F. v. M., Weak-leaved Mint-bush, *Leucopogon thymifolius*, Lindl., Thyme-leaved Heath, *Leucopogon glacialis*, Lindl., Twisted-leaved Heath, *Eucalyptus alpina*, Lindl., Grampians Gum, *Stylidium soboliferum*, F. v. M., Bristly Trigger-plant, *Bauera sessiliflora*, F. v. M., Showy Bauera, *Trymalium Daltoni*, F. v. M., Grampian Trymalium, *Pultenæa rosea*, F. v. M., Rosy Bush-pea; these are endemic to Victoria, and peculiar to the Grampians and south-west.

By Mr. F. G. A. Barnard.—Growing moss, *Dawsonia superba*, in pot with *Fagus Cunninghami*; also a spike of the orchid *Lyperanthus* (*Caladenia*) *suaveolens*, G. Reich., Scented Lyperanth, which had been exhibited at the October meeting (exhibition of wild-flowers) and was still fresh.

By Mr. R. A. Bastow.—Collection of lichens, illustrating the genera of Australian lichens.

By Mr. F. Chapman, A.L.S.—Ice-scratched stones from Glacial Hill, Werribee Gorge; also scratched stones from the Pleistocene Glacial of Moel-y-Tryfaen, North Wales, and Finchley, near London, for comparison with Australian examples.

By Mr. F. Cudmore.—Walking-stick made from wood of *Acacia acuminata*, Benth., from Western Australia.

By Mr. J. E. Dixon.—Sixty-seven species of Coleoptera collected during October around Ouyen and Hattah, North-Western Victoria.

By Mr. F. Pitcher.—Blooms of the following species of Erythrina, at present flowering in the Melbourne Botanic Gardens, viz.:—*E. Indica*, Indian Coral-tree, New South Wales, Queensland, and India; *E. acanthocarpa*, Tambookie Thorn, South Africa; *E. secundiflora*, Scarlet Coral-tree, Brazil; *E. Caffra*, Caffre Coral-tree, South Africa; also blooms of a species which is now flowering for the first time in the Gardens, probably *E. velutina*, Venezuela.

By Miss Rollo (on behalf of the pupils of the State school, Carisbrook).—Stages in the life-history of a saw-fly.

By Mr. P. R. H. St. John.—Herbarium specimens of *Pimelea pauciflora*, R. Br., Yellow-cup Rice-flower, order Thymelæaceæ, Victoria, New South Wales, Queensland, and Tasmania; *Pomaderris elliptica*, Labill., Apple-scented Pomaderris, order Rhamnaceæ, Victoria, New South Wales, Tasmania, collected by the exhibitor near Yering Gorge, 25th September, 1913; *Hibbertia serpyllifolia*, Labill., Thyme-leaved Guinea-flower, order Dilleniaceæ, Victoria, New South Wales, Tasmania; *Tetratheca ericifolia*, Smith, var. *rubæoides*, A. Cunn., order Tremandreæ, Victoria and New South Wales, collected by the exhibitor near Jack's Creek Cascade, Plenty Ranges, 27th September, 1913. These three species and one variety were not previously recorded as found growing so near Melbourne.

By Dr. C. S. Sutton.—Growing plants of *Pultenæa pedunculata* and *Bauera rubioides*.

By Mr. J. R. Tovey.—Specimens of *Cupressus macrocarpa*, showing Retinospora form with radial leaves. It corresponds to an embryonic condition brought out in adult shoots by special formative or morphogenic stimuli.

By Mr. C. S. Wentworth.—Growing plant of *Cheilanthes tenuifolia*, Sw., Common Rock-fern.

After the usual conversazione the meeting terminated.

Correction.—In last month's proceedings (page 114) *C. tortuserratus*, should read *C. totuserratus*.

EXHIBITION OF WILD-FLOWERS.

This year, on account of the more numerous exhibits, and the fact of the exhibition of wild-flowers being held in strange surroundings, under the gaze of a critical public, it appears that a number of interesting species were omitted from the report in the last (November) *Naturalist*, and, in addition, some wrong identifications and mis-spellings crept in. Flowers of the following additional species were exhibited, but by whom, or from what locality, cannot now be decided:—*Acacia brachybotrya*, *A. microcarpa*, *A. penninervis*, *Astroloma pinifolium* (*Styphelia pinifolia*), *Bauera sessiliflora*, *Boronia anemonifolia*, *B. pinnata*, *B. filifolia*, *B. inornata* (*B. clavellifolia*), *Bossiæa cinerea*, var. *rosmarinifolia*, *Billardiera cymosa*, *Cheiranthera linearis*, *Conospermum Mitchellii*, *Cassia phyllodinea*, *Dampiera marifolia*, *D. rosmarinifolia*, *Dillwynia hispida*, *Eremophila gibbosifolia*, *Helichrysum bracteatum*, var. *angustifolium*, *Loudonia Behri*, *Leucopogon glacialis* (*Styphelia glacialis*), *Micromyrtus microphylla* (*Thryptomene ciliata*), *Olearia pimeleoides* (*Aster pimeleoides*), *Pimelea microcephala*, *Phebalium glandulosum* (*Eriostemon sediflorus*), *P. bilobum* (*Eriostemon Hillebrandi*), *Prostanthera aspalathoides*, *Pultenæa laxiflora*, *P. mollis*, *Styphelia adscendens*, *Zieria veronicea*.

The following corrections should be made:—To Mr. A. Rutter Clarke's collection *Chamælaucium uncinatum* (*Darwinia uncinata*) (W.A.) and *Kunzea capitata* (N.S.W.) should be added, while *A. oleoides* should be *G. oleoides*, *Acacia macredemia* should read *A. macrademia*, *Prostanthera scabra* should be *P. denticulata*, and *Anigozanthus Mangellsii* should be *A. Manglesii*. In Messrs. Barnard and Stanton's exhibit, *Dillwynia subumbellata* should be *Pultenæa subumbellata*. In Mr. J. D'Alton's exhibit, *Bæckea plicata* should be *Micromyrtus microphylla* (*Thryptomene ciliata*), and *Astroloma conostephnoides* (*Styphelia Sonderi*) should be *A. conostephioides*. In Mrs. Parks's exhibit, *Styphelia Richea* should be *S. Richei* (*Leucopogon Richei*). In Mrs. Wise's exhibit, *Boronia polygalifolia* should be *B. anemonifolia*, and *Pultenæa* should be *Dillwynia*. On page 118, in the first line, *Helichrysum scorpioides* should be *Helipterum incanum* and *Micranthera hexandra* should be *Micranthemum hexandrum*.

A Butterfly Farm.—At Bexley, in Kent, Mr. L. W. Newman has established a butterfly farm, where during the year hundreds of the rarer butterflies and moths are reared, besides which a number of hybrids have been produced, which command fancy prices, so make the venture a paying concern. Has any one tried hybrid-raising in Victoria?

EXCURSION TO WERRIBEE GORGE.

On Cup morn, 4th November, 1913, a party of nineteen in all assembled at the Bacchus Marsh railway station to take part in this excursion. There was a biting wind, but the weather promised to be fair. After the usual delays the party were seated in the vehicles provided, and a pleasant drive of about five miles brought us to a point well on the track from the Ballarat Road to the Gorge. It had been intended that the whole party should re-assemble at the Upper Shelter-shed, when the plans for the day would be finally settled. A few maps had been distributed, and the leader's cab left first ; but, stopping to pick up the milk, it was overtaken by the second vehicle, which made such good progress that its passengers were discharged some minutes in advance of the other. These proceeded towards the rest-house, examining the new cutting on the way ; but, instead of keeping to the left, they took one of the tracks to the right which lead down to the river. About this time it was discovered that, by some law of mutual attraction, all the map-holders had entered the other vehicle. The further adventures of this mapless party are described later. The second load of excursionists in due course reached the shelter-shed, and, while some proceeded to "Picnic Point" in search of the wanderers, others boiled the billy. Early rising and the sharp air gave everyone a good appetite for the very early lunch. Ere it was finished advancing rain caused a flight from the open to the shelter-shed. Then it hailed. Then it snowed—really, truly snow, with dancing feathery flakes that gave a Christmas-card appearance to those who stood out in it. In fact, it was the snow which largely atoned for the weather-clerk's error in not sending a summer day. On account of this the main party were snow-bound at the shed until half-past one. Leaving a note for the others, this party then proceeded leisurely to "Full View Point," which rises 750 feet above the river. A halt was made to admire the scenery and to remark on what could be seen. Along the cliffs opposite runs a very straight, occasionally broken, scar —not quite horizontal, but dipping slightly in the direction of the river's flow. Possibly the result of river action in ages past, it attracted some attention, and, being examined with a glass, a bird was observed sheltering within. This creature, which in colour and attitude strongly reminded one of a disconsolate sparrow, was probably a Winking Owl, *Ninox connivens*. Some of the headlands show very conspicuous white marks. One at least of these is partly due to an unweathered exposure of rock ; others may be due to bird droppings, but the evidence available was not sufficient to settle the question. The lower rest-house was reached a little

in advance of the rain, and, while preparations were being made for tea, shouts announced the arrival of the lost contingent. As mentioned before, the natural shyness that had caused them to take the second vehicle had also prevented them asking for maps, and fate led them to the river instead of the shelter-shed. Here they very wisely did not attempt to retrace their steps, but carried out the campaign that had been drawn up as the morning's work for those who should desire active exercise—namely, to work up-stream to the junction of the Myrniong Creek, and as far along that stream as might be convenient. It was fortunate that they did so, for no one would have left the shelter-shed to fare through the Gorge in falling snow; yet, being out, the weather hampered them not at all, and part at least of the subsidiary programme was carried out. This party, in which there were a number of ladies, did some interesting exploring in the neighbourhood of Myrniong Creek. The river, being almost at flood level, had converted the enclosed land at that part—the "Island"—into a tract worthy of its local name. In returning down the stream to meet the main party, who, by the way, carried the billies and milk, while these explorers believed they had all the tea, some strenuous climbing had to be carried out, in which the ladies came out most creditably. At each bend of the river fresh geological aspects came into view, at one time a gigantic over-fold, at another a broad trough, and occasional minor rippling of the old slates. The magnificent bluff of "Daintree's Cliff" served as a landmark for most of the time before the Upper Shelter-shed was reached. In the deep pools of the river numerous "water-boatmen," a bug of the genus Gerris, were observed darting hither and thither, dexterously avoiding the upward saltations of the small trout, who, though nimble, were not quick enough to catch the "boatmen." In the shallows along the margins the tiny shells of Bythinella swarmed in myriads. A small but characteristic piece of the grooved floor of the ancient glaciated valley was picked up by one of the party. From the time of the re-union until well after four the weather was consistently bad. Small parties occasionally ventured forth, only to return to shelter, and even Mr. O'Donoghue's offer to lead volunteers to an abandoned mine failed to elicit a worthy response. Shortly before five we proceeded down stream, inspecting various objects of interest on our way—among them the glacial showing at Kelly's Creek, with its faults and vibration markings, and the small exposure of "*roche moutonèe*" near the crossing-place. Once again before reaching our vehicles we had to shelter from the rain, but, safely embarked at about half-past six, we in due course arrived at the station, where hot water was procured, and yet another

festive meal indulged in, which most satisfactorily disposed of a portion of the weary wait for the late train to take us back to Melbourne. As might be expected from the weather, few birds were seen—an Owl (mentioned above), White-shafted Fantails, some parrots, and one or two others were seen or heard. Two ferns particularly attracted attention—the Rock-fern, *Cheilanthus tenuifolia*, and the Rat-tailed Fern, *Asplenium flabellifolium*. As illustrating the capacity of the Gorge for visitors, we afterwards learned that there were two separate parties there the whole day, looking out for the excursion, who only found it after returning to the station. In spite of the weather, the excursion was a success. Everyone was "keen," the main points of interest were seen, while there was sufficient unexpected mild excitement throughout the trip to create a pleasant sense of adventure. In conclusion, I would express my sense of obligation to those members of the Club and their friends, more particularly Messrs. Chapman, O'Donoghue, and Billinghurst, who showed such a warm and sympathetic interest in the trip and contributed so much to its success by the practical assistance they afforded in many ways.—A. L. Scott.

REMARKS FOR BENEFIT OF FUTURE VISITORS.

(1) Obtain a map from the Tourist Bureau.
(2) Go out by Ballarat-road. Gate to track is on left, opposite a homestead with trees, and just past the 38-mile post. From hereabouts the people of Bacchus Marsh viewed the illuminations of the American Fleet in Hobson's Bay, more than thirty miles away.
(3) At the next gate, following the sign, the track turns left, and at the third gate to the right. A considerable number of kinds of rock may be found in the heaps at the margin of this field.
(4) Beyond the next gate, which lies in a hollow, is a cutting on the hillside, showing afar off, which affords a section of glacial conglomerate.
(5) At the top of this cutting a good track to the right, which is not shown on the map, affords a short cut to the track to the bottom of the Gorge. Go up stream to the junction of the Myrniong, which follow for a few yards for the sake of the folds and intrusions. Then follow up the Werribee a few hundred yards for the glacial striations and the granite contact.
(6) Back to shelter-shed and Picnic Point. Follow track along cliff to Full View Point. Fine views are obtained at both places, and at the latter the junction of Ordovician and Glacial may be seen on the opposite cliff; also a remarkable scar.
(7) Proceed to lower shelter-shed. Half-way down the descent the synclinal valley is visible on the opposite side, slightly to the left. The natural U curve of the folds forms the bed and banks of the stream—somewhat unusual, streams usually carving out a course rather in the neighbourhood of a fracture in a saddle.
(8) Explore up-stream if inclined, but return to point marked on map as "Crossing-place when river is low." *En route* look at glacial in Kelly's Creek, then at "Roche Moutonèe," with its glacial markings; this lies in a sort of hollow, facing slightly down stream and just above the line of the crossing.
(9) Cross and proceed up-stream to dry gully; follow this up to dry falls,

then keep up right-hand slope, and just above the selvedge of *Acacia montana* a dump will be found, and a drive that was put into the glacial for gold.

(10) Brittlebank (see reference) states that neither "Stringy-bark" nor Prostanthera is found growing on the granite, but that the latter abounds in dense growth on the Ordovician and a stunted form of the former makes a dense forest on the poorer slate country. The granite is thinly covered with Casuarina, Yellow Box, Banksia, and Blackwood.

(11) A coach leaves Bacchus Marsh railway station for Myrniong daily on arrival of early Melbourne train. This passes gate to track mentioned. Picnic parties may arrange with Messrs. Wills and M'Vicar, of Bacchus Marsh, for conveyances.

Formations. — East of Gorge generally the surface is Glacial, of Permo-Carboniferous age.

At Picnic Point and in one or two other places it is overlaid by Volcanic, and is penetrated in at least one place by a porphyry dyke. Many of these dykes may be seen in the Gorge ; they are older than the Glacial.

The folded rocks are Ordovician (often, however, called Lower Silurian), and are older than the bed-rock of Melbourne, which is Silurian. Falcon's Lookout and Daintree's Cliffs are capped with Glacial, while the railway runs on Newer Volcanic. This overlies a Tertiary formation, which crops out between the line and the place marked on the map as "Bald Hill" (not to be confused with the site of the quarries, some miles away). This deposit is referable to the same age as some of the "red sands" of the south coast and Melbourne areas.

The Gorge itself has been carved since the flow of Newer Basalt, and in point of age compares with the valley of the Yarra between Fairfield Bridge and Queen's Bridge.

References.—Many papers have been written dealing with this interesting locality. The following are some that may interest the general reader who desires to pursue the subject :—

1. *Aust. Assoc. for Advancement of Science,* vol. v., 1893—Paper by Brittlebank and Sweet.
2. *Proc. Royal Soc. Vict.,* 1892-3—Papers by Officer and Balfour.
3. Supplement to *Education Gazette and Teachers' Aid,* 21st May, 1906. (This is a description in popular language, quite free from scientific terms.)
4. *The Victorian Naturalist,* June and December, 1894, and January, 1908.
5. *Monthly Geological Progress Report,* May, 1899 — Map only, by Brittlebank.—A. L. S.

A Unique Plant.—The *Country-Side* (London) for November gives an illustration of a unique plant which has been in the succulent house at Kew Gardens for nearly fifty years. It is a member of the pine-apple family, and attracts considerable notice on account of its silvery yet forbidding aspect, the white leaves being armed with strong tooth-like spines as firm as iron. The plant has not changed for the last thirty years, except that every ten years or so it has flowered. Its uniqueness arises from the fact that it is the only example of the plant known, either wild or in cultivation, and as it shows no inclination to produce offsets or mature seed, it seems likely to remain the sole representative of its kind in the world.

VICTORIAN FOSSILIFEROUS LIMESTONES AND THEIR CORRELATIVES IN OTHER LANDS.

Synopsis of an Illustrated Lecture

By F. CHAPMAN, A.L.S., Palæontologist to the National Museum, Melbourne.

(*Delivered before Field Naturalists' Club of Victoria, 8th Sept.*, 1913.)

LIMESTONES are amongst the most important rocks which come under the notice of those who study fossils. Organic remains found in limestones are, as a rule, well preserved as compared with those found in rocks in which the sealing-up process has been protracted over a more or less lengthy period. The clays and marls may be considered next in importance, for they also usually contain fossil remains in good condition, especially when of the close-textured kinds. Incoherent marl-rocks and sandstones, on the other hand, cannot be compared with the limestones in their excellently preserved animal remains, including pre-eminently the corals and foraminifera. The group of the mollusca, however, may be quoted as an exception, for the marls are perhaps more suitable for the preservation of this type of organism in relation to their original shell-structure than even the limestones.

Victoria is particularly well favoured in the occurrence of large deposits of limestone both of Palæozoic (earliest) and Cainozoic (latest) periods. The rocks of the Mesozoic (middle) period, however, are practically wanting in this State, but are represented by the Jurassic limestones of Western Australia, the Lower Cretaceous of Queensland, New South Wales, and South Australia, as well as by the Chalk of Gin Gin, in Western Australia.

In treating of this subject from the standpoint of the fossil contents, the youngest series, being most familiar to us, may be taken first in order, and limestones forming at the present time make an interesting study. Young sand-dunes are often seen along the coast of Victoria, only a few feet in height, and upon these are generally found growing such plants as the sand-binding grasses and salt-loving shrubs. These plants, by their spreading and fibrous roots, bind the shifting sand-mounds and prevent their removal by the wind. Sometimes these dunes are as much as 120 feet high, as were seen at Torquay about eight years ago, but which have been reduced during the lapse of six years to 40 feet. The dune-sand, being largely composed of comminuted shells, is continually undergoing solution by percolating rain-water containing CO_2, the mineral matter being re-deposited around the underlying grains. Thus the mass is gradually transformed into a hard limestone such as is used at

Sorrento and Warrnambool for the buildings. The older dunes of Victoria contain fossil remains of extinct marsupials, as *Palorchestes*, thus pointing to the fairly ancient character of some dune-rocks. Thin slices of dune-rock under the microscope show the component organisms to consist of fragments of the shells of molluscs, plates and spines of sea-urchins, joints of star-fishes, and foraminifera. These dune-rocks, whether found on the coasts of England, Africa, India, or elsewhere, are all much of the same nature and general organic origin. In warm countries the curious little oolitic grains, themselves of plant origin, form a large part of the dune-sand rock, as in India and on the shores of the Red Sea.

In Pleistocene times in Victoria many of the lakes, both inland and coastal, became the home of myriads of shells and crustacea (ostracoda), and, according to whether these mollusca and ostracoda are of fresh-water or brackish habits, so we get a clue as to the origin of the deposit. Besides shells like *Bulinus* and *Coxiella*, there are often found quantities of the carapaces of the ostracoda of the family *Cypridæ*, which swarmed in the lacustrine waters.

Referring to Kalimnan or Lower Pliocene times, the Victorian occurrences of limestone are unimportant, and consist largely of shell-marls rather than limestones, many of which are crowded with molluscan shells, which may indicate shallow conditions by the presence of *Natica* and *Glycimeris*, or deeper conditions by *Pleurotoma*.

The chief Cainozoic limestones of Victoria may be referred to the Janjukian series, of Miocene age elsewhere. Such rocks are seen in the Waurn Ponds stone and the Batesford limestone, the harder portions of which are used as a building stone (Moorabool stone), as, for example, in the new City Police Court.

The interesting features of some of the geography of this old Miocene period was touched upon, and by following Haug's map of the geosynclines or earth troughs of that age it was seen that a certain group of foraminifera known as *Lepidocyclina* marked out, in its occurrence in various localities, the shore of the old Mediterranean or Tethyan Sea. The genus of foraminifera mentioned is found at Batesford and other places in Victoria, where we have represented the most southerly extension of this Miocene sea, excepting perhaps that indicated in New Zealand. Other examples of this great limestone-making epoch were illustrated, as the echinoids and fish-remains, groups which are as well represented amongst Victorian fossils as those from any other part of the world.

The older Cainozoic series of Balcombe's Bay was commented upon, and the calcareous concretions or cement-stones, showing

well-preserved fossils as foraminifera and pteropods, were noted.

A passing reference was made to the Mesozoic series represented in other Australian States, and then to the Palæozoic group, with the vast carboniferous deposits of spirifer, crinoid, and foraminiferal limestones of some northern countries.

The next oldest formation, the Devonian, is well developed in Victoria. The Buchan limestone makes an excellent marble, and compares favourably with the finest from any other part of the world. Slides were shown to prove its coral reef origin, and a fair idea was gained of the beauty and variety of its corals, as *Campophyllum*, *Favosites*, and *Cystiphyllum*, whilst ostracoda and shell-fish played an important part in building up certain portions of this Devonian marble. The Devonian limestones of Devonshire show similar characters to the Australian, and in some of them remarkable changes have been set up by subsequent crushing and shearing.

The Silurian limestones were next reviewed, and some weathered and sliced corals, as *Favosites*, *Cyathophyllum*, *Phillipsastræa*, *Columnaria*, and *Heliolites* served to show how exquisitely preserved are some of these calcareous organisms Amongst the smaller fossils of this Silurian system, but none the less interesting, is the series of ostracoda gathered from a piece of rubbly limestone at Cave Hill, which yielded twenty-six species of this group of crustacea. Seventeen of these were already known to science, the remainder being new. Of the known forms, eleven were Silurian elsewhere, four Ordovician, one Devonian, and one Carboniferous. Among other Silurian limestone localities in Australia, Hatton's Corner, near Yass, is remarkable as containing a rich fossil fauna, which it will take many years to scientifically work over.

Coming down to the oldest limestone occurrences in Victoria, that found near the Dolodrook River, North-East Gippsland, by our fellow-member, Mr. E. O. Thiele, is of an extremely interesting nature. It dates back to the Upper Cambrian, and its fossil fauna consists of trilobites, a primitive limpet, some brachiopods, and a pellet-forming seaweed, *Girvanella*, probably related to those primitive plants which form the pebbles and oolite sand on the shores of the Salt Lake, Utah, at the present day.

A concluding reference was made to the discovery of one of the Archæocyathinæ (a link between sponges and corals) in a little pebble picked up at 85° S. by a member of the Shackleton expedition, and which has so important a bearing on Antarctic geology in proving the southward extension of these ancient Cambrian rocks.

NOTE ON THE OCCURRENCE OF THE CAINOZOIC SHARK, *CARCHAROIDES*, IN VICTORIA.

By FREDK. CHAPMAN, A.L.S., Palæontologist to the National Museum.

(With text figure.)

(*Read before the Field Naturalists' Club of Victoria, 18th Oct.*, 1913.)

OF the many interesting palæontological links connecting the Patagonian strata of South America with the Victorian and South Australian deposits of Cainozoic age, not the least striking is this present occurrence of the teeth of two species of the shark referable to the genus *Carcharoides*, Ameghino. One of these species is new, whilst the other corresponds with Ameghino's *C. totuserratus*.

The fact of this genus having hitherto been confined to the Patagonian beds and now occurring in the well-known Waurn Ponds quarries gives support to the opinion that both series formed parts of the same sea-bed.

Dr. F. Ameghino described the genus *Carcharoides* in 1906 * in a footnote in his work on "Les Formations Sedimentaires du Crétacé Supérieur et du Tertiaire de Patagonie." He therein states that *Carcharoides totuserratus* has the teeth as in *Lamna*, but with the denticulated edge as in *Carcharodon*.

The Patagonian series has been regarded as of Lower Eocene age by Ameghino.† His conclusions have been largely drawn from an examination of the fishes, although other groups are quoted, in his definition of the older Patagonian series as distinct from the newer or Santacruzian, with mammalian remains. As pointed out by Ortmann, ‡ it is difficult to subdivide this series, which (as in Australia) is characterized by a persistent or long time-range fauna.§ Moreover, Ameghino has followed Mercerat in separating five horizons by so unsatisfactory a guide fossil as *Ostrea*. The fish fauna represented in Patagonia is very similar in general aspect to that of the older series in Victoria (the Barwonian), and the only element of discord in the faunas from both areas is the presence of a few archaic

* "Anales del Museo Nacional de Buenos Aires," ser. 3, vol. viii. See p. 183 (foot-note) and fig. 50.

† *Op. cit.*, p. 498.

‡ "Reps., Princeton Univ. Exped. Patagonia," 1896–99, vol. iv., pt. 2, 1902, p. 284 *et seq.*

§ It may here be noted that the subaerial and fresh-water deposits referred to as Santacruzian by Ameghino are correlated by that author with his marine Suprapatagonian, and these, with the underlying Patagonian series, are included in his Eocene. Ortmann has shown, however, that there is a distinct time-break between that series and the Patagonian, which does not justify their inclusion in one epoch, as Ameghino held.

genera (not species) like *Scapanorhynchus* (now discovered, however, in Japanese seas in deep water) and *Asteracanthus*, which are typically Cretaceous elsewhere. On overwhelming molluscan and other evidence the Patagonian series resembles parts of the Oamaru system in New Zealand, and in the main comparable with our Victorian Janjukian.

Description of *Carcharoides tenuidens*, sp. nov.—

Tooth of *Carcharoides tenuidens*, sp. nov. Cainozoic; Waurn Ponds, Vict.; nat. size.

Holotype.—Tooth of slender habit. Root slightly arched and moderately stout. Crown acutely triangular, flattened on the outer face near the junction with the root, and otherwise depressed convex; inner face roundly convex; edge view showing a wide recurvation of the lateral line, as in *Odontaspis*. Edge crenulate, with blunt serræ. Lateral denticles well developed, sharp, and turned towards the crown.

Measurements.—Total length from base to apex, 20.25 mm. Extreme width at base of root, 12 mm.; thickness, 4.5 mm. Width of crown at junction with root, 7.25 mm.; thickness, 3.75 mm. Length of lateral denticle, 3.75 mm.

Occurrence.—Waurn Ponds quarry, near Geelong. Cainozoic (Janjukian) age. This specimen was found by Mr. J. F. Mulder, to whom the credit is due of discovering many interesting and rare fossils in the Geelong area.

Carcharoides totuserratus, Ameghino.

This form is represented by several specimens from the Waurn Ponds quarries, and they will be described in detail in a subsequent paper.

BLACK FOX FARMING IN CANADA.—Ten to fifteen years ago Black Fox skins could be bought at about £17; now from £75 to £250 can be obtained. This great advance in the price, caused by the limitation of the original hunting and trapping grounds by the spread of habitations, has resulted in the establishment of numerous ranches or fox farms in Prince Edward Island, New Brunswick, and other parts of Eastern Canada. A large amount of money has been sunk in the industry, as may be seen from the fact that good specimens for breeding purposes fetch £1,000 each, while the progeny of one female has in seven years realized £10,000, and recently six pairs of live black foxes passed to Russian purchasers at £20,000. The success of fox farming has caused attention to be turned to the breeding of other fur-skin animals, such as Skunk, Ermine, Marten, Otter, and Mink.—P. FAIRBANK, in *Country-Side*, October, 1912.

The Erythrinas, or "Coral-trees."—The Erythrinas constitute a genus of handsome plants, principally trees and shrubs. There are, in all, about 30 species distributed throughout tropical regions in different parts of the world. The generic name is derived from *erythros*, red, in allusion to the colour of the flowers. Two species are Australian—viz., *E. indica* and *E. vespertilio*. The best known to Australians is the former, which is the tree grown so abundantly about Sydney and the surrounding suburbs, and sometimes called the "Flame-tree." This plant is strikingly beautiful by reason of its gorgeous red flowers, which are borne in great profusion, principally at the apex of the stems. In Melbourne it is very shy in flowering, owing, probably, to the less tropical character of the climate. There are a number of well-grown plants in the Melbourne Botanic Gardens, some of which are about 20 feet in height. This year flowers have developed in greater abundance than previously on one of the plants in the "Mound Garden," where it presents a very bright and gorgeous appearance. A fine specimen of another species, *E. secundiflora*, a native of Brazil, having bright scarlet flowers, is now flowering in perfection on the Hopetoun Lawn, and, like some other species, this plant is leafless while in bloom. *E. acanthocarpa*, E. Meyer, known as the Tambookie Thorn, and *E. Caffra*, Thunberg, the Caffre Coral-tree, both natives of South Africa, are also flowering at the present time in the Gardens. The other species growing here are :—*E. arborescens*, Roxburgh, Himalayas ; *E. Blakei*, hybrid ; *E. corallodendron*, Linn., North America and West Indies ; *E. crista-galli*, Linn., Brazil ; *E. crista-galli*, var. *compacta*, Brazil ; *E. Harrisonii*, Hort, garden origin ; *E. Humei*, E. Meyer, South Africa ; *E. latissima*, E. Meyer, South Africa ; *E. insignis*, Todaro ; *E. herbacea*, Linn., North America and West Indies ; *E. speciosa*, Andrews, West Indies. All of these are beautiful and attractive objects as they come into bloom during the summer months.—F. Pitcher. 15th November, 1913.

"Fifty Miles Round Melbourne."—Such is the title of G. R. Broadbent's map and guide to the holiday resorts near Melbourne, and field naturalists and others who want reliable information as to where to go and what to see cannot do better than purchase a copy of the new edition just issued. All the main and many of the minor roads are given, with distances from important junctions. Personal experience has shown the publication to be everything it claims to be if intelligently used, and one need have no fear of getting bushed if a copy of the map is at hand. Its moderate price, one shilling, places it within reach of all.

The Victorian Naturalist.

Vol. XXX.—No. 9. JANUARY 8, 1914. No. 361.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 8th December, 1913. Dr. C. S. Sutton, one of the vice-presidents, occupied the chair, and about 50 members and friends were present.

THE LATE DR. MORRISON.

The chairman alluded to the loss the Club had sustained by the recent death of Dr. A. Morrison, who had been a member of the Club since 1884, though never taking a very prominent part in its doings, and who had for some years acted as Government Botanist of Western Australia.

REPORTS.

A report of the excursion to Mooroolbark on Saturday, 22nd November, was given by the leader, Mr. C. French, jun., who said that, owing to threatening weather, the attendance was rather small. On reaching Mooroolbark the open country towards the ranges was traversed. Here the Leek Orchid, *Microtis porrifolia*, was very plentiful, while on the bushes of *Leptospermum scoparium*, which were in full bloom, several species of buprestid beetles of the genus Stigmodera were taken, among them being *S. amplipennis*, *S. nasuta*, *S. octosignata*, *S. thompsoni*, and *S. anthifulosa*. Under the bark of the eucalypts the singular feathery-legged bug, *Ptilocnemus lemur*, which is an excellent object under the microscope, was found in all stages. Planarians were numerous under the logs, several species being taken. Scale insects of several kinds were observed on the wattles and eucalypts.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. Wolf Glance, 72 High-street, St. Kilda, Mr. E E. Pescott, F.R.H.S., Horticultural Gardens, Burnley, were duly elected ordinary members, and Rev. T. Theodor Webb, Port Augusta, S.A., a country member of the Club.

PAPERS READ.

1. By Mr. J. Searle, entitled "An Addition to the Victorian Freshwater Copepoda."

The author said the species described was first taken during a Club excursion at Alphington on 16th October, 1912. Since then it had been found in several places around Melbourne, and, though not previously described as such, has

been recorded in reports of Club excursions and elsewhere under the name of *Boeckella asymmetrica*. It is the smallest species of Boeckella but one, exceeding *B. minuta* in length by 15 mm. only. In quite a number of specimens of this new species taken recently, the females were attacked with a parasitic growth attached to the abdomen. This in no way impeded their movements, nor did it seem to affect their vitality. Specimens so afflicted, as well as normal individuals, were exhibited under the microscope to illustrate the paper.

2. By Professor Ewart, D.Sc., Ph.D., &c., entitled "Senses of Plants." This took the form of a lecturette, illustrated by a fine series of lantern slides, showing how plants adapted their sensitivity and powers of response to their natural surroundings.

Professor Ewart said the popular idea of plants was that they were without powers of sensation or movement, whereas the poet largely ascribes to plants human attributes. Neither of these views were quite correct, the mean between both extremes actually applies. A sense organ was simply a structure or mechanism developed in order to enable an organism to perceive particular classes of environment such as light, heat, contact, or chemical substances. The sense of equilibrium was specially developed in plants so that they could adjust themselves in accordance with their environs. The power of detecting light rays in plants surpassed that of animals, as it was through light that most plants directly obtained their food, and hence light was more important to plants than animals. Plants had a feeble kind of rudimentary intelligence, in a sense they had their likes and dislikes and an elementary kind of memory was shown by many. For instance, in regard to their night or sleeping attitude, they could remember and continue to respond to previous alterations of light and darkness. Thus under uniform conditions of illumination or non-illumination they continued to perform their ordinary sleep movements for a time.

The chairman said that the Club was indebted to Professor Ewart for his interesting lecturette.

A discussion followed, in which Messrs. Gabriel, Hardy, and Pitcher took part.

NATURAL HISTORY NOTE.

Mr. J. Gabriel, referring to a paper read some time ago by him on Mutton-birds, mentioned that the explanation of the fact that bones of Mutton-birds were sometimes found in large numbers was due to the sand having suddenly drifted over the nests, thereby smothering the nesting birds. A drift in another direction some time later removed the sand and exposed the bones.

Messrs. Coghill and Rosenhain also spoke on the subject.

EXHIBITS.

By Mr. C. C. Brittlebank.—"Plane-tree Leaf Scorch," *Glocosporum nemecquum?* (Fckl.), Sacc., causing damage to the Plane-trees in several inland towns in Victoria.

By Mr. C. J. Gabriel.—Marine shells, *Pinna tasmanica*, Ten.-Wds., from Port Phillip, and *Vulsella lingulata*, Lam., from Port Albert and Western Port.

By Mr. F. Pitcher.—Flowering branches of Erythrinas—*E. Blakei*, Blake's Coral Bush, a hybrid, and *E. Crista-galli*, L., variety *compacta*, Compact Coral Tree, a native of Brazil, now flowering in the Melbourne Botanical Gardens; also, specimens of *Mimosa pudica*, L., Common Sensitive Plant, native to Brazil; *Drosera binata*, "Forked Sundew"; and *Anastatica Hierochuntina*, "Rose of Jericho," a native of Asia Minor and N. Africa. This annual plant retains the property of expanding when moistened and again curling up when dry. When the seed ripens the leaves wither and droop, the whole plant becomes dry, each branch curls inwards, until the plant presents the appearance of a ball of wickerwork at the top of the unbranched stem. In this state it is soon loosened from the soil and carried about by the wind. When moistened the branches unbend, and the pods begin to open by splitting longitudinally, and so, if lodged in favourable localities, produces fresh individuals.

By Miss Rollo.—Pebbles from Brighton Beach, England, also near Hamilton, and near Essendon, Victoria.

By Mr. J. Searle.—Specimens of *Boeckella asymmetrica*, J. Searle, n. sp., under the microscope, in illustration of his paper.

After the usual conversazione the meeting terminated.

About Members.—Miss Freda Bage, M.Sc., who has been engaged in science work in Brisbane for some time, has been appointed Principal of the Women's College to be opened shortly at the Queensland University.

Mr. A. H. E. Mattingley, C.M.Z.S., has been elected president of the Royal Australasian Ornithologists' Union for 1913-14.

"The Austral Avian Record."—The October part (vol. ii., Nos. 2 and 3) of this publication to hand contains several articles of interest. Reference is made to Billberg's classification of birds, published in 1828, and his list of the birds of Scandinavia. These afford opportunity for discussing the priority of several generic names now in use. The editor, Mr. Gregory Mathews, has an article on "New Generic Names," with notes on some others, in which many Australian birds are re-christened, while nine pages are devoted to "Additions and Corrections to the Editor's Reference-list," of which by this time little of the original can remain.

THE MALLEE : OUYEN TO PINNAROO.

BOTANICAL NOTES.

BY A. D. HARDY, F.L.S., State Forests Department, Melbourne.

(*Read before the Field Naturalists' Club of Victoria, 14th July*, 1913).

SEVERAL geographical descriptions of the Mallee have been published in the *Victorian Naturalist*, and an excellent general survey may be read in a Parliamentary paper by Mr. Stuart Murray, late Chief Engineer of the Water Supply Department. But, in order that this paper may be "self-contained," and that the part to be particularly noticed may be better located, the following brief sketch may not be deemed superfluous.

The accompanying map, which I have compiled from my field-notes and data obtained from various articles in the *Victorian Naturalist*, has, through the courtesy of the Surveyor-General (Mr. J. M. Reed, I.S.O.), been printed by the Lands Department. For the lines of equal rainfall and the line indicating the probable northern limit of usable water I am indebted to Mr. A. S. Kenyon, C.E., of the State Rivers and Water Supply Commission. Any general notes on vegetation away from areas shown as naturalists' localities have been obtained after much sorting of vernaculars used by Lands Department surveyors (chiefly Messrs. Urbahns, Turner, Harvey, Poole, Tobin, and Breen), and from information and specimens supplied by Mr. Perry, the State Forest officer for the Northern Mallee. A reference to the symbols employed in the map will be found accompanying the description of plate, &c.

Not to be too precise in a matter with which we are, for the moment, only indirectly concerned, we may say that the Mallee country is the large north-western corner of Victoria cut off by an imaginary line drawn from Swan Hill, on the Murray River, south-westerly to the South Australian border ; and an area which extends beyond the Murray into New South Wales and into South Australia. Physiographers have shown that this tract is the raised bed of a sea or great estuary into which flowed rivers such as the Darling, Lachlan, Murrumbidgee, Murray, and Loddon, which now, confluent in full season, reach the sea by the channel of the lower Murray—these from the north and east chiefly ; but from the Grampians and Pyrenees highlands on the south flow the Wimmera, the Yarriambiack, Dunmunkle, Avon, and Avoca—streams of which only the last (and that in good rainy season) is continuous, the others ending in lakes, swamps, or marshes. The Wimmera flows into Lake Hindmarsh, and, in good season, out of it northerly as Outlet Creek and into Lake Albacutya, and again northerly out of this still as Outlet

Creek. Sometimes this creek is merely a broken chain of water-holes ; at others the flow reaches as far as a few miles north of Pine Plains homestead, where it spreads and evaporates. The River Red Gum, *Eucalyptus rostrata*, penetrates the Mallee from the south by way of Outlet Creek.

Botanical inquiry has shown that the several types of country included in the Mallee bear respective flora, though the line of division is only definitely seen with regard to a few—overlaps occurring, and in places the apparent change is due to vegetative rather than specific difference ; but in either case thus giving variety to what otherwise would be a monotonous and dreary expanse. At its best the greater part of the Mallee is a wilderness, and much of it desert, with fertile areas in belts and isolated patches which, when cleared of native vegetation, are suitable for agriculture. The Victorian section occupies about a fifth part of the State, and is gently undulating, with innumerable low sand-hills, peculiarly orientated, the trend being approximately east and west. A few sand-hills rise to 200 feet in height—*e.g.*, Mt. Gnarr and Mt. Jess. In most parts it is well vegetated ; in some, densely so. In some respects the desert flora bears affinity to that of the Kimberley desert of North-West Australia. The term "desert" is used in a popular sense, "Desert Sand-hills," &c., being widely known ; but the plant formation is "semi-desert," suggested for an intermediate between sparsely vegetated woodland and desert. The ecological feature is edaphic rather than climatic. Habitation and settlement advance in this district with the progress of artesian and pumped water supply, which are dependent on the vigorous efforts of the Departments of Water Supply and Agriculture. The land is of too porous a nature to allow of surface irrigation, but by boring for domestic supplies the Departments are, if not reclaiming the desert, turning large areas of wilderness into a land of activity and plenty.

At mid-day and during the late forenoon and early afternoon, in summer, when wild nature takes its siesta, the unfrequented Mallee is an awful solitude that might well drive an anxious man crazy long before he becomes physically prostrated by hunger or thirst. But in the morning and evening, and even through the middle hours in cooler weather, the loneliness is less evident. Birds and beasts come forth in search of water and food, almost immune from the dangers of an advancing settlement. The rainfall average ranges from about 11 or 12 inches in the north to about 20 inches further south, and this may be compared with the yearly average of 41 inches for the heavily-timbered coast-land of the Cape Otway forest region, where tall eucalypts, and an umbrophilous undergrowth along the streams and shady slopes, are the dominant features.

My notes are almost confined to the northern section, of which the western boundary is only a political one, and even then to that part of it which I traversed in company with Mr. Kenyon. A self-imposed restriction will be seen in the omission of reference to a great number of plants of lowly growth. My observations were chiefly made during forced marches, and mostly from buggy or saddle, so that, by stooping, specimens could be obtained without the collector dismounting. The occasion was a botanical tour on behalf of the Forests Department, to whom I am indebted for permission to utilize the notes then made.

Ouyen is a township of growing importance and a railway station on the line from Melbourne to Mildura, at 290 miles from the metropolis and 63 from Mildura, on the Murray River. Height above sea-level, about 165 feet. Pinnaroo is the north-easterly terminus of a railway from Adelaide, and which, at 162 miles, stops just short of the Victorian border near the 141st meridian. The road which connects the two townships is gently undulating and in parts level, and about 85 miles in length westerly from Ouyen. The railway, since constructed, through Tiega, Walpeup, Underbool, and Cow Plains to Murrayville, leaves still 17 miles to be traversed by road.

I will endeavour now, by means of lantern views from negatives taken by Mr. Kenyon, Mr. Dave Crosbie, and myself, to take you over the route of our travel. To reach Ouyen, one may leave Melbourne by the 6.40 a.m. train, and, passing Castlemaine, Maryborough, St. Arnaud, Donald, and Birchip, arrive at his destination at 2.40 a.m. next day. This we did, and out of the many notes made during the long train journey I am offering five :—(1) Red ironbark, *Eucalyptus sideroxylon*, begins to show up in quantity after passing Dunolly (the timber hitherto being chiefly box-eucalypts) ; with it is associated *E. melliodora*, *E. hemiphloia*, and *E. leucoxylon*. (2) At Sutherland, beyond St. Arnaud, the bull-oak plains begin ; considerable tracts of what looked like *Casuarina suberosa* (not the buloke, *C. Luehmanni*), interspersed with box-eucalypts. *E. sideroxylon* not in evidence. (3) The most noticeable bird throughout the train journey was the magpie, and it will be of interest to ornithological members to state that the change from one species to another appeared near Swanwater, in a belt of country about 10 miles wide, in which White-backed and Black-backed birds (respectively *Gymnorhina leuconota* and *Gymnorhina tibicen*) could both be seen, but few of either. To the south of this belt all were of the former species, while to the north of it I saw only the Black-backed birds. (4) The first Callitris (pine) seen was between Swanwater and Donald, (5) Mallee flora in quantity was first noticed a dozen miles or so

beyond Birchip. Mallee scrub with Casuarina and box flats continue till a desert patch between Turriff and Ouyen is reached, with pines increasing in quantity. After this the characteristic flora of the Mallee is continuous. The daylight faded soon after passing Birchip, and subsequent observations as far as Ouyen were by moonlight, and doubtful.

After a short sleep at a lodging-house, we were up at 6 for a hurried examination of the immediate environment of the township before early breakfast. Many interesting trees and shrubs were seen here, amongst others *Fusanus* (*Santalum*) *persicarius*, with fruit (neglected because of its bitterness), *F. acuminatus*, with fruit missing (one would not expect to find a quandong bearing ripe fruit near a settlement, since the pericarp of this once-named native peach is eaten raw when ripe, or before maturity made into jam), *Pittosporum phillyræoides*, with pendent flexible twigs that earned the name "willow" for it locally, and with hard-coated fruits, sometimes 2 but occasionally 3-valved, rich yellow without, gaping and exposing orange-red sticky seeds within, and altogether a pretty shrub, or, rather, small tree. The flowers of this species are pale yellow, and the wood, exceedingly brittle, is close-grained, creamy, and suitable for carving and wood engraving. Other shrubs were *Hakea leucoptera*, *Acacia salicina*, and *Cassia eremophila*. A few pines were still to be seen, and *Heterodendron oleæfolium* here and there made one of the few tree growths of small size. None of the Mallee eucalypts near at hand had flowers or fruit, and were not identified.

From Ouyen we drove in a buggy, in which were stored provisions for several days, and, with three horses drawing, we soon covered the 6 miles of the road to the pump, tank and trough which were the outward and visible signs of Tiega. The absence of goodly-sized pines along the road is accounted for partly by the past demand for this ant-resisting timber for house-building and fence posts. The country was fairly open, with clumps of low eucalyptus scrub, and further vegetated with *Acacia salicina* (the orange-yellow bloom of which was very conspicuous where other blooms were scarce), *Hakea leucoptera*, &c. Occasionally small saline flats could be seen monopolized by sometimes several or at others only one member of the Salsolaceæ. Thus, a flat might bear Atriplex, Kochia, and Salicornia, or Salicornia might be wanting. Again, Salicornia (*S. australis*) would have a monopoly. This fleshy-twigged plant is locally called Bead-bush. Here and there we saw areas containing surface limestone, the result of deposition on evaporation of water brought up by capillary attraction. There are also deposits called kopi, and "kopi flats" are spoken of. I could not see that any marked difference in

flora occurred owing to the presence or absence of kopi. One small plain grew only "Dillon-bush"—a low, small, and succulent-leaved shrub of salty taste and allied to Zygophyllum. This was recently identified for me at the National Herbarium as *Nitraria Schoberi*, L.

Northerly, then, through gently undulating but mostly flat country of savannah type, we drove along an old and faint wheel-track which was often lost, and recovered by scouting horsemen temporarily attached to the party; the team twisting, doubling, and dodging; ourselves alert to seize overhanging branches and ward off danger; crashing through *débris*, loosening an iron step here, breaking a strap there; halting now and again to disengage a snag that had locked the wheels. The conspicuous flowering plants were composites—Helichrysums chiefly, and of these *H. lucidum* seemed most abundant. Occasionally a little salt-flat was crossed, and I have noted that *Nitraria Schoberi* was associated with *Salicornia australis* and the introduced *Sonchus oleraceus*. Sometimes the Mallee clumps and scattered bushes were interspersed with heathy undergrowth, little of which was in bloom, and at times with grass-land.

A few miles before reaching Wymlet we arrived at "Log-tank," which comprises an iron trough, bucket, and wire rope, and, as the name of the place suggests, a sunken pit of rectangular section lined and partly screened from the sun with pine logs. When poured into the trough the water smelt offensively, and produced bubbles that lingered on the surface. I was assured that this was due only to sulphuretted hydrogen and CO_2, and that the water was good; in witness whereof some of the horses and some of the men drank of it. The others sniffed, and anticipated the better water at Wymlet. Had we been really thirsty we would not have been so dainty, for this log-tank and trough, and others of its kind, are veritable life-saving agencies in this waterless district.

At Wymlet (the nucleus of which is an excavated shallow water-hole or tank, of large area, and the environment mallee scrub) we camped for the night, sleeping on the ground, with saddles for pillows. The horses, when liberated, fed on the tall cane-grass which grew, 6 feet high, in the adjacent crab-hole. This grass is *Glyceria ramigera* (to be called Bamboo-grass), and for robustness, straight growth, and fodder value reminds one of the equally tall *Glyceria* (*Poa*) *dives*, the "wild oats" of the Gippsland mountain forests. These are excelled in length only by that pest of the mountain scrubs, *Ehrharta juncea*, the well-known Wire-grass. I was told that *G. ramigera* attains a height of 15 feet in very favourable localities. Hereabout the mallee is of three species—viz.,

E. gracilis, *E. oleosa*, and *E. uncinata*. On slightly rising ground were tall pines and Comb Grevilleas, *G. Huegelii*, in bloom, the latter making a very pretty picture when backed by the dark green Callitris. The wood of this Grevillea is of a reddish-brown colour, and mottled by the medullary rays which are a conspicuous feature of all the Proteaceæ. It is suitable for cabinet work of small dimensions. The shrub would be a handsome addition to any park or large garden, but is too harsh and straggling for a small space. The lowly sister species, *G. ilicifolia*, was to be seen. I have a suspicion that this plant has occasionally been confused with *G. aquifolium*, which is a more prickly shrub. Also, in this locality were *Acacia salicina* and *Hakea leucoptera*, but these are common Mallee plants. In the morning, delay in starting was caused by the escape of a horse, and the sun was well up, and hot, before the result of the futile pursuit was known. The loss was serious, as from this point the buggy was to go back with a pair of horses and three of us were to ride on into new country. The difficulty was overcome by the driver volunteering to steer the buggy with only one horse attached to the pole all the way back to Ouyen, and this feat, we subsequently learned, he successfully accomplished without mishap and in the same *sang froid* in which he had made the proposal.

We three, then, set out with several days' provisions, water-bags, camera, &c., attached to ourselves or saddles, and went at a smart trot through scrub of composition similar to that just described. A few miles on we reached a small excavation containing water, and the ruin of a log hut about 15 years old. There were thistles on the embankment, and numerous old cattle-tracks about the place. This place Mr. Kenyon named Meridian Tank, because of its position near the 142nd meridian, a little to the west of north of Wymlet. The country here was still open, with clumps of mallee 15 to 18 feet high as at Wymlet, almost flat, with an absence of pines, and with a little "Porcupine"—a most appropriate name for the grass tussocks named on departmental plans "Spinifex" and by the Plant Records Committee "False Spinifex." There is nothing false about this plant, *Triodia irritans*. It pretends not at all; but the small hemispherical tussocks resemble nothing so much, in the distance, as a porcupine with quills erect, and I strongly advocate this vernacular for adoption.* In places it grows to a height of 3 feet and 3 or 4 feet across, with fruiting-stems reaching to the saddle-top. The horses picked their way daintily among the tussocks and stepped high over the small ones and

* "*La Festuca ou Triodia irritans, l'herbe porcépine des colons*," Ferdinand Mueller, 1866.

jumped absurdly high over the larger to avoid the needle-like leaves, but eat with avidity the fruit, which, right and left, they snatched while on the march. Here, too, was *Melaleuca parviflora* and Dillon-bush and Turpentine—a name that is quite as good as "Sticky Wallaby-bush" proposed for *Beyeria viscosa*, a shrub which may be very low or several feet high, and has foliage which, crushed in the hand or bruised by passing hoof or wheel, smells like turpentine. As Turpentine it figures on the Lands Department plans, and indicates good country in the same degree as Porcupine suggests a poorer soil. Another acacia here, not collected nor in bloom, looked like *A. retinoides*.

Soon we ascended a sand-hill to take bearings, and located Mount Gnarr, 50 degrees west of south, and 8 or 10 miles away, apparently. The country to the north-west and south-west appeared to be a mixture of sand-hills and flats, and probably the small hill on which we stood was a fair sample of the many in the neighbourhood. Those we crossed later were in many respects similar. The roots of plants on this porous substratum must be of enormous length. Even small plants, of 6 or 12 inches height, which I endeavoured to secure whole, defied me. The principal constituents of this sand-hill shrubbery were :—*Leptospermum lævigatum* (with smaller leaves than the maritime specimens of this Coast Tea-tree, and giving one the impression that he was not on a far inland sand-hill, but on a coastal sand-hummock, with visions of *Myoporum insulare* and *Styphelia Richei*), *Casuarina distyla*, *Banksia ornata* (not in bloom), *Exocarpus spartea*, *Bæckia crassifolia*, and *Grevillea pterosperma*—the last-named with old, black fruit-pods gaping and empty. This shrub, I was told, is known as "Plum-bush." I failed to discover any specific difference between the Big Pine of the better land and the She or Little Pine of the poor sand-hills. Both are var. *verrucosa* of *Callitris robusta*. The only conspicuous blooms were the yellow *Acacia salicina* and *Hibbertia densiflora* and the dark blue *Halgania lavandulacea*. A little later Walpeup was located to the east of south a little, and Mounts Gnarr and Jess about 35° west of south. Descending, we made our way north-westerly to a spot north of "Doubtful Plain" (on map of Victoria). This is "One-tree Plain," and about 8 miles north-west of Wymlet. The large, box-barked eucalypt that at the northern extremity of the plain gives it its name was without flowers or fruit, and I could not identify it. It may be *E. Behriana*. It towers above all the robust mallee eucalypts of the neighbourhood, and is a guide to the plain, some 3 miles in extent, where splendid grass is to be found, but no water, for a camp. This defect, and the desire to explore the country to the north-east, where,

during Mr. Crosbie's wanderings, he once found a crab-hole of water, sent us four miles in a north-easterly direction, over alternating sand-hills and little flats, the latter carrying salt-bush, bead-bush, and mesembryanthemum, or on slightly sloping ground much Porcupine. "Wire-bush" is a name locally applied to several acacias—*A. lineata*, *A. calamifolia*, *A. rigens*—which are to be found in this district. Here and there *Melaleuca uncinata* on higher sandy ground was associated with a lowly, switch-like shrub with Kunzea-like flowers with yellow petals (not collected or identified). The Mallee eucalypts of several species measured about 10 feet. We reached the water none too soon. Already shallow and muddy, the supply was fast evaporating. Strained to eliminate rubbish and organisms, it made good tea, and, before returning to One-tree Plain, more was boiled for water-bag supply for the long ride on the morrow.

Much of the Mallee eucalyptus in the vicinity of this crab-hole is like that which is scattered through the Mallee district, and which is denied specific rank by some botanists. Its coriaceous, grey-green, broad leaves single it out from amongst other species, such as *E. gracilis*, *E. uncinata*, and *E. oleosa*: and if it be not *E. dumosa*, and only a variety of *E. incrassata*, it is a well-marked variety, with much smaller and less ornate fruits and buds, different time of flowering, and inclination to keep to lower ground, while *E. incrassata* grows luxuriantly on the low, better-soil sand-hills. Before returning to One-tree Plain we examined a grove of *Casuarina lepidophloia*, as Belar often indicates a water-holding soil. There was no water, but we came upon the site of the camp of the survey party which, 25 years or so ago, marked the line of the 142nd meridian. Here were the old tent-pegs still sticking in the ground, and on being withdrawn were seen to be decayed only about a quarter of an inch. Here, too, were the stumps of the trees cut up for firewood and pegs. Here a chopping-block, and there a few unused pegs—all Belar. This species of Casuarina is noted for its resistance to decay in the ground. Where not in the ground, old pegs, chips, &c., were perfectly sound. And this tree, with the pine (Callitris), is threatened with extermination. We crossed one flat where the scattered eucalypt bushes about the margin sheltered no undergrowth or grass; but between them and in the open centre of the depression were acres of *Mesembryanthemum æquilaterale*, a dazzling blaze of pink almost concealing the fleshy leaves. This had a peculiar effect on the eyes, to which white objects, such as my horse, a fallen blank page of a pocket book, &c., were of a greenish hue, the reaction producing this illusion being well known in the matter of complementary

colours, but somewhat novel in these circumstances. Other flats were not so monopolized, the pig-face giving room to Kochia, Atriplex, and Salicornia.

At One-tree Plain the horses were hobbled and allowed to graze on the good grass, and we tore abundant bedding from the giant hop-bushes and turpentine, and were soon asleep.

At 4.30 next morning we were up, and, after a light and hasty breakfast, began a ride of 22 miles through more untrodden country to reach a point on Sunset Track where there *might* be water in a log tank, and where also the buggy might reach from Underbool with horse-feed and provisions. This ride revealed patches of good land, undulating and flat, but most of it poor, and some of a desert nature, with much sand-hill and Porcupine. About half-way through we came on fine groves of Belar, and suspected water in the neighbourhood, but found none. Here we lunched on short rations, and limited ourselves to one mouthful each of water from the rapidly flattening saddle-bags, hardening our hearts meanwhile against the whinnying of the thirsty horses, which, however, got some grass in the neighbourhood of the Belar. Again in the saddle, we crossed more sand-hills, carrying stunted eucalyptus, she-pine (a name given to the dwarfed specimens of *Callitris robusta*, var. *verrucosa*, common in such situations), and *Melaleuca uncinata*, *Bæckea Behrii*, *Grevillea pterosperma*, *Casuarina distyla*, *Acacia salicina*, *Hakea leucoptera*, *Fusanus persicarius*, &c., pausing on every eminence to search the horizon with field-glasses and take bearings. A higher sand-hill than the rest seemed to me to be as low, or less, than neighbours when once it was ascended, and about on all sides there seemed a billowing sea of sand clothed irregularly with vegetation. Few photographs were taken, and the note-book rather neglected, as we could not afford time for the pictures, and a horse that insisted on jumping even small "Porcupines" precluded the other. Towards evening we reached Sunset Track (while behind us to the horizon smoked the trail which we had marked by dropping lighted matches into the Porcupine-grass tussocks) and found water in a shallow clay-hole and in a log-tank; but the latter was avoided, because of the evidence of drowned rabbits, and the clay-hole of yellow water was about to be resorted to when fresh water was found in a kerosene tin that had been concealed in a shady corner of the log-tank for us. Before the discovery was made, however, one of the party had drunk of the clay water with the horses, which slaked a thirst that had accumulated since the previous afternoon, and for this he suffered two days later. Later, on searching, we found bags containing horse-feed tied to the branches of the mallee, and knew that the buggy had been,

and would return with provisions, &c. So it eventuated, and we camped, sleeping on the ground as before, but without the springy mattress of hop-bush. At 4.30 next morning I examined a small salt lake near the camp, and a rough sketch made of a vertical section is appended by way of description. On the Exocarpus were red lichens, while those on the Melaleuca were pale green and of other species. From this camp we rode a few miles south-easterly, and then towards Mount Gnarr, across varying country containing much flat, poor land bearing luxuriant Porcupine of 3 feet 6 inches vegetative growth, and fruiting at nearly double that height on slender stalks. The Porcupine occupied considerable spaces among scattered low eucalyptus (not in fruit). There was more kopi, and occasional grassy flats where Wallaby-grass, *Danthonia penicillata*, flourished. This grass is one of the best Mallee fodders in season. On sandy soil and gentle slopes we saw fine trees of *Fusanus acuminatus*, *F. persicarius*, and *Heterodendron oleæfolium* (which last has at least four common names in the Mallee—viz., Emu-tree, Willow, Cabbage, and Quinine or Apple-bush). These were interspersed with pines and *Acacia brachybotrya*. *A. salicina* is distributed widely through the Mallee, being the commonest of the acacias. The Weeping Pittosporum, *P. phillyræoides*, grew more abundant as we advanced. Presently a beautiful and novel view broke into the landscape. On ascending a small sandy rise of the better sort we looked down into a depression, and were astonished to see a lake of fair size surrounded by low sand-hills, and bright pink in colour, rendered more conspicuous by the green of the pines, quandongs, sandalwood, cabbage, and the rest of the group previously mentioned, and which almost surround the lake. There are four of these lakes close together, and the fact that they are situated at a spot where on old maps "Salt Lakes" was recorded, suggests that the lakes were known before, but were not then pink. The colour is in the salt, not in the water, as far as one could judge. A small quantity of the shallow water appeared colourless as a similar quantity from "the deep blue sea," and seems due to chemical impurity in the salt, and not to an organism, such as a microscopic alga. At the leeward side of the larger lake a fringe of drowned insects—mostly Coleoptera, and containing "lady-birds," &c.—marked a ripple limit, beyond which was a strip of wet pink salt. Outside this was a belt of dry, almost white salt, but with intense pink showing at any fracture or vent, and then mud and sand, salsolaceous plants, and grassy slope up to the edge of the depression, where grew a variety of trees already named and Mallee eucalypts. I waded out in the lake some 50 yards or more, but found only a clean, pink, firm bottom of salt. The salt bottom is, however, not

so firm in places as it looks. Mr. Scarce (Mr. Kenyon's assistant in boring operations) has recently waded across in several directions, finding it very shallow throughout, but nearly came to grief when, at one place at the northern end, the sub-aqueous salt-crust gave way, and left him floundering in deep, dark, evil-smelling mud, with the crust breaking under his weight like the edge of the ice round a hole. Eventually a thicker layer or a more dense substratum gave necessary support. These two lakes are described, on maps of surveys since made, as Pink Lakes collectively.* I now suggest the names Lake Kenyon (for the largest) and Lake Crosbie (adjoining on the west), to commemorate an engineer, whose work will always be associated with Mallee history, and his lieutenant in exploratory work, who shared with us the delight of discovering this beautiful feature in an already charming landscape. In the neighbourhood of the Pink Lakes, *Cassytha melantha* was frequently seen on Heterodendron, Hakea, and other shrubs. In one case four trees of Heterodendron and two Hakea shrubs were linked together by this parasite, which in the Mallee is called Mallee-vine, or simply vine.

Riding reluctantly away from Pink Lakes, we passed through fine savannah, well grassed and with a sprinkling of *Eucalyptus uncinata*, &c. Here the quandong trees bore fruit in plenty, and looked very ornamental. The quandong fruit is spheroidal, and at maturity the pericarp, reddish-coloured on the outside,† is semi-succulent and sweetish ‡ and $\frac{1}{8}$-inch thick, enclosing a spherical nut with extremely hard, wrinkled, and pitted shell, of about $\frac{3}{4}$-inch diameter. This is *Fusanus* (*Santalum*) *acuminatus*. The Ming, Ming-Quandong, or Bitter Quandong, *F. persicarius*,§ differs in general appearance so slightly that it is difficult to discriminate, especially as the two rarely grow in the same locality, the Ming favouring poorer ground than the Quandong. The chief differences appear to be in the palatability of the Quandong, and its smaller and more wrinkled and pitted nut-shell, as against the larger, smoother nut-shell of the Ming, coupled with bitterness of the pericarp. Bushmen, however, can at a distance identify either species, so there must be, to them, some marked difference in general appearance. The leaves of both are narrow lanceolate and more or less acuminate. The emu, which is an agent in dispersal of the seed, shows no favour to either species.

*There are four in the group, two being much smaller, as shown by recent survey.

† Not "blue," as in Morris's "Austral English" (1898).

‡ Not "thoroughly insipid," as in "Gum Boughs," by D. Macdonald (1888).

§ Specially named in harmony with the vernacular "Native Peach."

At 9.30 we were in a fine basin to the south-west of Mount Gnarr, where, in a shallow catchment, we found water, with Cane-grass and Nardoo. Here were signs of improved water storage—old but unmistakable traces—and we felt we were on the eve of further discovery. The depression was fringed with mallee scrub and pine. Ascending the further rim, we came upon the old ruins of a hut and pine-log yards, with abundant thistles, and sheep-droppings in and about the place. Here was. about 30 years ago perhaps, an out-station of a homestead on the Murray, but abandoned through failure of the water supply. "Old hut and yards" was the name for a point on the Sunset Track where we had camped the previous night, and where, according to legend, some ruins had once been seen. Evidently we had chanced upon the actual spot. Soon we were on Mount Gnarr, from which, at above sea-level height of about 300 feet, but about 200 feet above the general level near base, we had a fine view of hundreds of square miles of country —a billowy sea of mottled colour, mostly green and grey-green —the former for pine belts, when darker, and for mallee when less dark and rich, with a drab colour for the two species of Casuarina (*C. lepidophloia* and *C. Luehmannii*), Belar and Buloke, and grey-green for the most of the other trees and shrubs, with here and there bare sand of the rises gleaming between and advertising the desert nature of the locality. The horizon was almost lost in haze, but an irregularly undulating limit to the light blue could be made out, and after much consultation one less indefinite point was located as Walpeup neighbourhood, and another as the point beyond which lay Underbool. Mount Gnarr is sparsely covered with deep-rooted, harsh-leaved shrubs, such as *Acacia salicina* and *Hakea leucoptera*, and, nearer the base, stunted eucalyptus and dwarfed pine. Some of the mount is bare sand. Descending, we rode back southerly to another point on Sunset Track, across some good cultivable country of low sandy, alternating with nearly flat loamy, land, well vegetated. This point is on Cheeses Plain, where there is much visible limestone or kopi over an area some miles across, and near by is Double Tanks (called so for a reason implied by the name) ; and, after traversing some more undulating country of sandy nature bearing she-pine and much *Eucalyptus incrassata*, the latter with abundant bloom and copious nectar (surely a good bee-tree), and acacia, &c., we reached the camp of the boring party in charge of Mr. Scarce at Underbool, where we were made comfortable for the night.

From Underbool we drove through a luxuriance of pine, eucalyptus, and melaleuca, with *Acacia salicina*, *A. brachybotrya*, and *Cassia eremophila*, &c., forming an under-shrubbery, along

the main road, with here and there a box eucalypt (not specifically identified), until we reached Cow Plains, where the country is open, with large mallee eucalypts here and there, some with large lumps of the limestone with which Cow Plains is charged about the stem bases, as though the trees, in growing, has raised them from the general level of the plain, as paving stones are displaced by growing street trees. The thickest stem of the larger mallee shown in the lantern picture is 18 inches diameter, and, irrespective of species, large growths like this are called Big Mallee, Giant Mallee, and Bull Mallee. The smallest of all mallee is called Whipstick, and may be found along the road to Murrayville and other parts of the State—north and west of Bendigo, for instance.

Arrived at Murrayville, we discussed Mallee questions while seated on rustic seats of sawn mallee root round a mallee-root fire at a Mallee settler's home. Next morning I set off with Mr. Crosbie to tap the desert country about 12 miles to the south, and after riding through miles of selected land, some in process of cultivation, some bearing crop, and some being cleared of scrub by means of bullock teams drawing Red Gum tree-trunks as rollers, we reached the poor country, bearing *Melaleuca uncinata*, *Bæckia Behrii*, Porcupine, &c., and at last reached the desert fringe, beyond which miles of country were burnt, leaving only the charred remains of dwarf eucalypts, melaleuca, stunted pine, &c., to indicate the nature of the flora. Meandering emu tracks were plentiful, and the restiveness of the horses suggested a ground—if not a body—scent, perceptible to them, though the birds were not visible. Evidently the emus had wandered over the burnt area in quest of scorched beetles, &c., and perhaps Ming fruit. Professor Ewart's recent paper, "Delayed Dehiscence in Callistemon," was brought to mind by the sight of the scorched capsules of Melaleuca (an allied genus of like habit), freely open. The seeds were perhaps already preparing to germinate (though, being small, none were seen), and next season the area would be all reclothed with dwarf forest. My companion was now ill from effects of water drunk at the clay-hole on Sunset Track after the long, hot ride from One-tree Plain, and, having nothing to warrant our continuing our journey further south, we returned to Murrayville. About half-way to the desert fringe there is, at a small water-hole in the midst of a wheatfield, two River (!) Red Gums, *Eucalyptus rostrata*—the only specimens to be found in the district. These escaped slaughter and conversion into mallee-rollers by forking at a few feet from the ground. The branching was conspicuously acute-angled. At Murrayville that night we searched for seedling pines by the light of a lantern carried by an enthusiastic member of

the Progress Association (for it had been stated elsewhere that seedlings of the Callitris could not be found), and found some.

From Murrayville to Pinnaroo and beyond, south-westerly, the country gets poorer and hungry-looking, the soil more calcareous, and the vegetation of a still more xerophilous nature. Pinnaroo has several substantial buildings, built of cement or reinforced concrete, and is far ahead of any of the settlements on the Victorian side. As far as one could determine from the moving train and at stoppages, the vegetation south-west from Pinnaroo for many miles indicates a desert region, including as principal constituents stunted mallee and several ungraceful acacias, not in bloom or fruit, and other shrubs of harsh and wiry nature. The botanical interest in our journey ceased here, and the long train ride home *viâ* Tailem Bend (at the Murray, in South Australia), Serviceton, Ararat, and Ballarat gave us opportunity to obtain the fair measure of sleep that we had denied ourselves when there was so much to do and to see.

In the following list of plants collected or seen, many of which were identified or the names verified at the National Herbarium, the second column contains the common names proposed by the Plants Records Committee, while in the third column are the names used in the district :—

RANUNCULACEÆ—		
Clematis microphylla, D.C.	Smaller Clematis	
Ranunculus lappaceus, Sm.	Common Buttercup	
DILLENIACEÆ—		
Hibbertia densiflora, F. v. M.	Silky Guinea-flower	Primrose
LAURACEÆ—		
Cassytha melantha, R. Br.	Large Dodder-laurel	Mallee Vine
C. glabella, R. Br. ..	Small Dodder-laurel	
PITTOSPOREÆ—		
Pittosporum phillyræoides, D.C.	Weeping Pittosporum	[tree Willow, Quinine-
Billardiera cymosa, F. v. M.	Sweet Apple-berry ..	Climbing Bluebell
Bursaria spinosa, Cav. ..	Sweet Bursaria	
RUTACEÆ—		
Eriostemon sediflorus, F. v. M.		
GERANIACEÆ—		
Geranium dissectum, L. ..	Cut-leaved Geranium	
Erodium cygnorum, Nees.	Blue Erodium ..	Blue Geranium
ZYGOPHYLLEÆ—		
Zygophyllum apiculatum, F. v. M.	Pointed Twin-leaf	
Nitraria Schoberi, L. ..	.. .. ..	Dillon-bush
STERCULIACEÆ—		
Lasiopetalum Behrii, F.v.M.	Pink Velvet-bush	
EUPHORBIACEÆ—		
Beyeria opaca, F. v. M. ..	Small Wallaby-bush	
B. viscosa, Miq.	Sticky Wallaby-bush	Turpentine-bush

CASUARINEÆ—		
Casuarina lepidophloia, F. v. M.	Belar	.. Belar
C. Luehmanni, R. T. Baker	Buloke ..	.. Buloke
C. distyla, Vent.	Stunted Sheoak	.. Little Sheoak
SAPINDACEÆ—		
Heterodendron oleæfolium, Desf.	.. ..	Cabbage-bush / Apple-bush
Dodonæa viscosa, L. ..	Giant Hop-bush	.. Hop-bush
D. stenozyga, F. v. M. ..	Desert Hop-bush	
SALSOLACEÆ—		
Atriplex semibaccatum, R. Br.	Berry Salt-bush	..Creeping Salt-bush
Atriplex halimoides, Lindl.		
Kochia sedifolia, F. v. M.	Dense Blue-bush	.. Blue-bush
K. stelligera, F. v. M. ..	Starred Blue-bush	
K. villosa, Lind.	Silky Blue-bush	.. Cotton-bush
Salicornia australis, Soland.	Sea Glasswort	.. Bead-bush
Salsola kali, L.	Prickly Saltwort	
Chenopodium microphyllum		.. Salt-weed
FICOIDEÆ—		
Mesembryanthemum æquilaterale, Haw.	Angular Pigface	.. Pigface
POLYGONACEÆ—		
Muehlenbeckia Cunninghami, F. v. M.	Tangled Lignum	Lignum
LEGUMINOSÆ—		
SUB-OR. PAPILIONACEÆ—		
Swainsona procumbens, F. v. M.	Trailing Swainsona	.. Blue Pea
Cassia phyllodinea, R. Br.	Leafless Cassia	
C. eremophila, Cunn. ..	Desert Cassia ..	.. Boronia-bush
SUB-OR. MIMOSACEÆ—		
Acacia salicina, Lind. ..	Willow Acacia	.. Willow-wattle
A. brachybotrya, Benth.	Silvery Acacia	
A. hakeoides, Cunn. ..	Hakea Acacia	.. Wattle
A runciformis	Streaked Acacia	
A. retinoides, Schl. ..	Wirilda ..	.. Wattle
A. pycnantha, Benth. ..	Golden Wattle	
A. calamifolia, Sweet ..	Needle-leaved Acacia	Wire-bush
A. rigens, Cunn. ..	Wallaby Acacia	.. Wire-bush
MYRTACEÆ—		
Bæckea Behrii, F. v. M. ..	Broom Heath-myrtle	Broom-bush
B. ericacea, F. v. M. (?) ..	Small Heath-myrtle	
Leptospermum lævigatum, F. v. M.	Coast Tea-tree	.. Tea-tree
L. scoparium, R. & G. Forst.	Manuka ..	.. Tea-tree
L. myrsinoides, Schl. ..	Myrrh Tea-tree	.. Tea-tree
Callistemon coccineus, F. v. M.	Scarlet Bottle-brush	.. Bottle-brush
Melaleuca parviflora, Lind.	Moonah	
M. uncinata, R. Br. ..	Broom Honey-myrtle	Broom Tea-tree
M. pustulata, J. Hook. ..	Blistered Honey-myrtle	Tea-tree
Eucalyptus uncinata, Turcz	Hooked Mallee	.. Grey Mallee
E. gracilis, F. v. M. ..	Slender Mallee	.. Red Mallee
E. incrassata, Lab. ..	Thick-leaf Mallee	
E. dumosa, A. Cunn. ..	.. ..	.. Scrub Mallee
E. oleosa, F. v. M. ..	Oil Mallee	

E. rostrata, Schl.	River Red Gum	.. Red Gum
E. Behriana, F. v. M. (?), .	.. ..	.. Bull Mallee
E. bicolor (?)	.. ..	.. Box
Calytrix tetragona, Lab. ..	Haircup	
SANTALACEÆ—		
Fusanus acuminatus, D.C.	Sweet Quandong	.. Quandong
F. persicarius, F. v. M. ..	Ming Quandong	.. Ming
Exocarpus spartea, R. Br.	Broom Ballart	.. Cherry
E. aphylla, R. Br.	Leafless Ballart	.. Currant
PROTEACEÆ—		
Grevillea pterosperma, F. v. M.	Desert Grevillea	.. Plum-bush
G. Huegelii, Meiss. ..	Comb Grevillea	
G. ilicifolia, R. Br. ..	Prickly Grevillea	.. Native Holly
Hakea leucoptera, R. Br.	Needle Hakea	.. Needle-bush
H. rostrata, F. v. M. (?) ..	Beaked Hakea	
Banksia marginata, Cav.	Silvery Banksia	.. Honeysuckle
B. ornata, F. v. M. ..	Desert Banksia	.. Honeysuckle
COMPOSITÆ—		
Helichrysum scorpioides, Lab.	Curling Everlasting	.. Everlasting
H. lucidum, Henck. ..	.. ..	.. Everlasting
H. obtusifolium, Sond. & F. v. M.	Blunt Everlasting	.. Everlasting
H. bracteatum, Willd. ..	Golden Everlasting	.. Everlasting
H. leucopsidium, D.C. ..	Satin Everlasting	.. Everlasting
H. apiculatum, D.C. ..	Pointed Everlasting	.. Everlasting
H. semipapposum, D.C. ..	Downy Everlasting	.. Everlasting
H. cymosa, D.C. ..	.. ..	.. Everlasting
Helipterum, spp.	.. ..	.. Everlasting
Senecio lautus, Sol. ..	Variable Senecio	.. Daisy-bush
S. magnificum	Showy Senecio	.. Daisy-bush
CAMPANULACEÆ—		
Wahlenbergia gracilis, D.C.	Austral Bluebell	.. Bluebell
SOLANACEÆ—		
Nicotiana suaveolens, Lehm.	Sweet Tobacco	
*N. glauca	Tree Tobacco	.. Tree Tobacco
Lycium australe, F. v. M.	.. ..	.. Thorny Salt-bush
ASPERIFOLIÆ—		
Halgania lavandulacea, Endl.	Lavender Halgania	
LABIATÆ—		
Prostanthera chlorantha, F. v. M.	Green Prostanthera	.. Mallee Thyme
Westringia rigida, R. Br.	Stiff Westringia	
Teucrium racemosum, R. Br.	Grey Germander	
MYOPORINEÆ—		
Myoporum platycarpum, R. Br.	Sandalwood ..	.. Dogwood
Eremophila longifolia, F. v. M.	Berrigan ..	.. Sandalwood Emu-bush
ERICACEÆ—		
Styphelia Sonderi, F. v. M.	.. ..	.. Heath
Astroloma humifusa, Persoon	Heath Cranberry	

* Introduced.

Epacris impressa, Lab. ..	Common Heath ..	Heath
Leucopogon cordifolium, F. v. M.	Heart-leaved Beard-heath	
CONIFERÆ—		
Callitris robusta, R. Br., var. verrucosa	.. ..	Big Pine, She Pine, and Scrub Pine
LILIACEÆ—		
Dianella revoluta, R. Br.	Spreading Flax-lily ..	Blue Lily
Xerotes juncea, F. v. M. ..	Desert Mat-rush	
RHIZOSPERMÆ—		
Marsilea quadrifolia, Linn.	Nardoo	Nardoo
JUNCEÆ—		
Juncus communis, E. Meyer	Common Rush ..	Rush
GRAMINEÆ—		
Stipa semibarbata, R. Br. (?)	Fibrous Spear-grass ..	Spear-grass
Danthonia penicillata, F. v. M.	Wallaby-grass ..	Wallaby-grass
Triodia irritans, R. Br. ..	False Spinifex ..	Porcupine
Glyceria ramigera, F. v. M.	Bamboo-grass ..	Cane-grass
Stipa eremophila, F. M. Reader	Desert Spear-grass	
Eragrostis setifolia (chætophylla, Stend.)	Bristly Love-grass	
Dichelachne crinita, Hook. f. (?)	Long-hair Plume-grass	Mallee Pampas

NOTE.—The specimen of *Lycium australe* was sent to me by the State Forester. It so resembles the larger species, *L. horridum*, or African Box-thorn that the name Mallee Box-thorn is now suggested. From near Lake Hattah Mr. Perry forwarded a specimen of *Codonocarpus cotinifolius*, F. v. M., as a rare plant.

TOPOGRAPHICAL CLASSIFICATION.

Topographical classification, in which not all, but most of the more conspicuous plants are included, with indications of maximum size, thus :—25 x 12 = 25 feet high, diameter stem 12 inches. ; *e.g.*, Belar 25–60 (ft.) x 30 (in.) The diameter of shrub stems is not given, nor the heights of some where the record would be due to "guessing from memory." Names in parentheses are in use by Mallee residents.

SAND RIDGES.—

(*a*) Good ridges, with sufficient humus in the soil to make it "sandy loam"—

Callitris robusta, var. *verrucosa* (Pine), 40.
Casuarina lepidophloia (Belar), 25–60 x 30.
C. Luehmanni (Buloke), 25–40.
Fusanus acuminatus (Quandong), 15 x 9.
Heterodendron oleæfolium (Cabbage), 12 x 20.
Hakea leucoptera (Needlewood), 12 x 6.
Acacia hakeoides (Wattle), 12 x 6.
A. retinoides (?) (Myall), 8 x 9.
A. salicina (Willow Wattle), –8.
Exocarpus aphylla (Currant), –10 x 9.
Eucalyptus gracilis (Heavy Red Mallee), –50.
E. uncinata (Heavy Grey Mallee), –40.
Clematis microphylla.
Grevillea aquifolia.
Melaleuca uncinata (Broom Tea-tree) –15 (infrequently).

(*b*) Poor ridges, with less humus and more sand than in (*a*)—
Callitris robusta, var. *verrucosa* (She Pine), of more bushy habit. (See illlustration, Plate VIII.) 10–20.
Fusanus persicarius (Ming), 15 x 9.
Melaleuca uncinata (Broom Tea-tree), –15.
Exocarpus aphylla (Currant), –6.
Bæckea crassifolia (Broom), –10.
Triodia irritans (Porcupine), –3.
Aster exul.
Senecio, sp.
Billardiera cymosa (Climbing Bluebell).
Eucalyptus incrassata, &c.

(*c*) Desert ridges—
Casuarina distyla (Little Sheoak), 4–10.
Callitris robusta (She Pine), 12–15.
Melaleuca uncinata (Broom Tea-tree), –10.
Grevillea pterosperma (Plum-bush), –8.
Banksia ornata (Honeysuckle), 4–8.
Hakea leucoptera (Needle-bush), –6.
Fusanus persicarius (Ming) (rarely, and poor).

FLATS.—

(*a*) Good flats, with loamy soil and free from excess of lime or salt—
Beyeria viscosa (Turpentine), –8.
Eucalyptus gracilis (Red Mallee).
E. uncinata.
E. incrassata, var. *dumosa*, –12.
E. oleosa.
Heterodendron oleæifolium (Cabbage-bush), 8–9.
Cassia cremophila (Boronia-bush), –6.
Kochia sedifolia (Blue-bush), –4.
Fusanus acuminatus (Quandong), 15 x 9.
Pittosporum phillyræoides (Willow), 15 x 9.
Casuarina Luehmanni (Buloke), 40 x 24.
Callitris robusta (Pine), 40 x 18.
Eremophila longifolia (Sandalwood), 15 x 10–12.
Bæckea crassifolia (Broom-bush), –18.
Grevillea Huegelii (Needlewood), –8.
Myoporum platycarpum (Dogwood), 20 x 15.
Dodonæa viscosa (Hop-bush), –12.
Acacia linifolia (?) (Wire-bush).

(*b*) Poor flats—
Light mallee of several species, including—
Eucalyptus incrassata, var. *dumosa* (Grey Mallee).
Beyeria viscosa (Turpentine), 2–5.
Triodia irritans (where sandy) (Porcupine); vegetative –3, inflorescence –7.

(*c*) Salt flats—
Salicornia australis (Bead-bush), –2.
Chenopodium, sp. (Salt-bush).
Atriplex, spp. (Salt-bushes), –2.
Kochia sedifolius (Blue-bush), –2.
Mesembryanthemum æquilaterale (Pig-face) (prostrate).

(*d*) Grass plains. Two shrubs which grow luxuriantly about the fringe or in scattered clumps or single bushes are
Dodonæa viscosa (Hop-bush), –12.
Beyeria viscosa (Turpentine), –6.

REFERENCE TO PRIOR PAPERS IN THE *Victorian Naturalist*, IN CHRONOLOGICAL ORDER. The numbers agree with those marking the respective localities on the accompanying map of the Mallee.

1. LE SOUEF, D. *Vict. Nat.*, vol. iv., p. 44, 1887.
Dimboola, Tullyvea, Lake Albacutya, Lake Hindmarsh, in December, 1886.
2. FRENCH, C. *V.N.*, vol. iv., p. 169, 1888.
Dimboola and Wimmera River, August, 1887.
3. FRENCH, C. *V.N.*, vol. v., p. 145, 1888.
Border Town, in South Australia, to Dimboola.
4. LE SOUEF, D. *V.N.*, vol. x., p. 123, 1893.
Dimboola and Ebenezer Mission Station, 10 miles away, 1892.
5. CAMPBELL, A. G. *V.N.*, vol. xvi., p. 121, 1898.
Hopetoun, Lake Bambrook, Pine Plains (accompanied by Dr. C. Ryan and C. French, jun.)
6. FRENCH, CHAS., JUN. *V.N.*, vol. xviii., p. 8, 1901.
Hopetoun, Lake Albacutya, Pine Plains.
7. BEST, D. *V.N.*, vol. xviii., pp. 80 and 89, 1901.
From Rainbow (accompanied by C. French, jun., and C. Walter).
8. GOUDIE, J. *V.N.*, vol. xix., p. 119.
Birchip, and northerly therefrom.
9. SUTTON, C. S. *V.N.*, vol. xxii., p. 180, 1905.
Jeparit, Lake Hindmarsh, &c., and general notes.
10. MATTINGLEY, A. H. E. *V.N.*, vol. xxvi., p. 64, 1909.
Hopetoun to Lake Albacutya.
11. D'ALTON, ST. E. *V.N.*, vol. xxx., p. 65, 1913.
With map drawn by A. D. Hardy from originals in Lands Department, but with all botanical and some physiographical data supplied by Mr. D'Alton.
12. WILLIAMSON, H. B. *V.N.*, vol. xxx., Oct., 1913.
Mildura.

No attempt is made here to account for other Mallee publications elsewhere, but it is hoped that a comprehensive work may some day be prepared by Mr. A. S. Kenyon, C.E., without whose advice and assistance, during association on our journey, I should have fared badly in more ways than one. Further, I may add, scattered references may be found in botanical notes on single plants by F. von Mueller, late Government Botanist; J. Goudie, in his notes on the Coleoptera about Birchip; F. M. Reader, D. M'Alpine (Fungi), &c.

EXPLANATION OF PLATE.

Fig. 1. Mallee Pine of the poorer sand-hills; "She Pine," "Scrub Pine," *Callitris robusta*, var. *verrucosa* (see text, p. 154). Photo. by Mr. D. Crosbie.

Fig. 2. A clay flat, north of Wymlet, bearing *Eucalyptus dumosa* (= *E. incrassata*, var. *dumosa*) and *Mesembryanthemum æquilaterale* (see text, p. 155). Photo. by Mr. A. S. Kenyon, C.E.

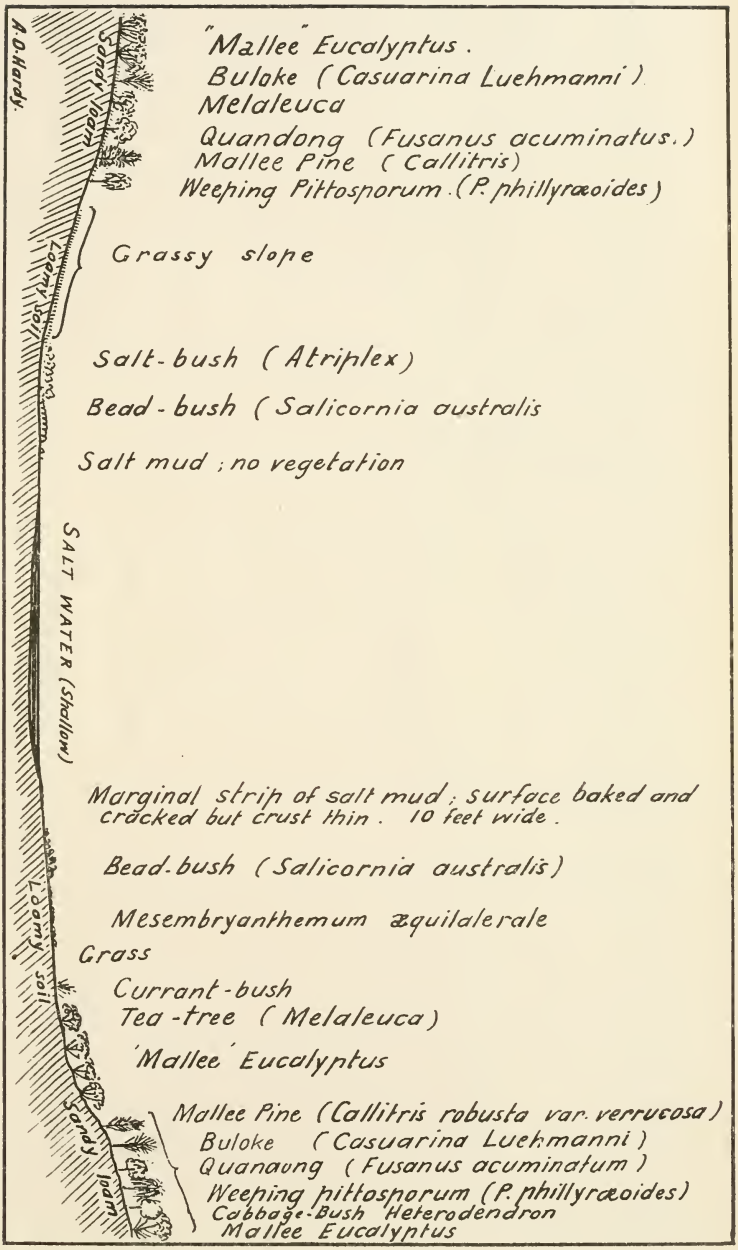
DIAGRAM.

Section of small salt lake, not to scale. The "Currant" is *Exocarpus aphylla*, and the Tea-tree *Melaleuca pustulata*. Quandong is *Fusanus acuminatus* (*Santalum acuminatum*). Some marshes or small lakes have other dispositions of flora surrounding them. One small dry bed had round the central baked mud a circle of *Salicornia australis* (Bead-bush) of about 50 feet width, and outside this a narrow encircling belt of Tea-tree. Bead-bush on dry land is said to indicate water near the surface, and it is commonly an inner circle round moist saline places.

PLATE VIII.

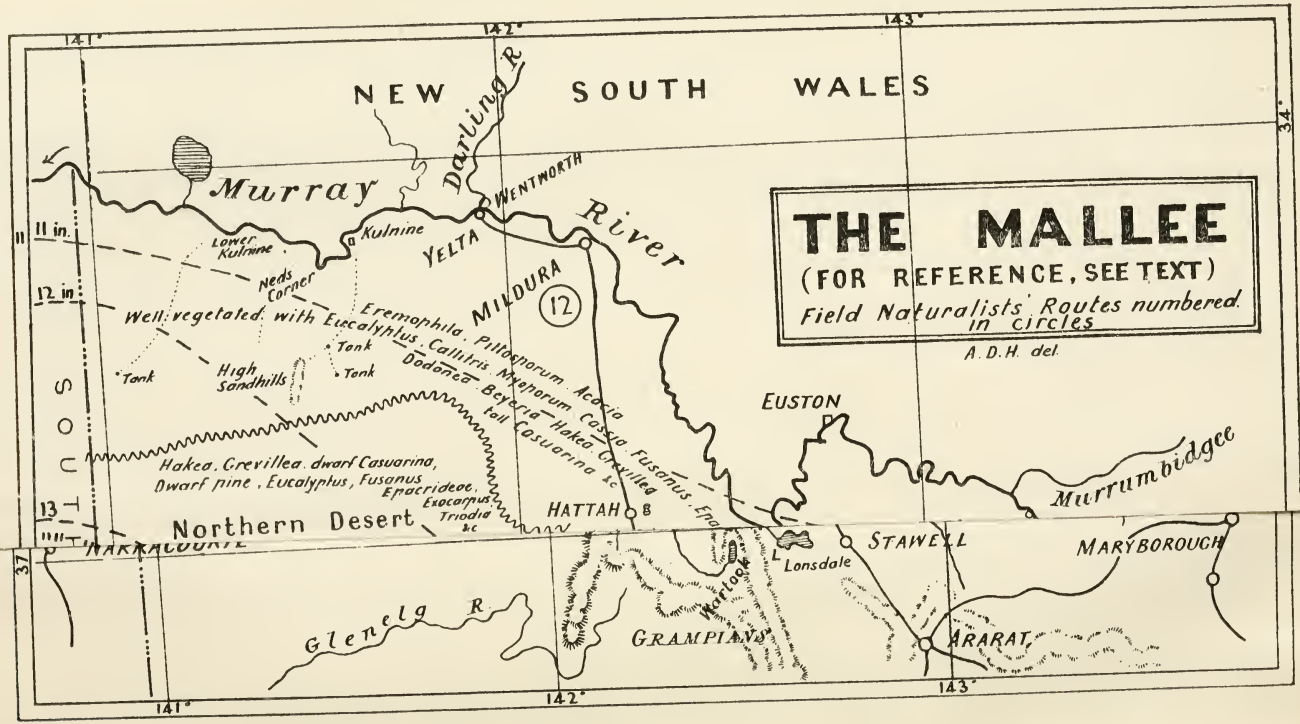
D. CROSBIE, *photo.* FIG. 1.

A. S. KENYON, *photo.* FIG. 2.



Vertical section, to show environment of a small Salt Lake

Diagram only


THE MALLEE
(FOR REFERENCE, SEE TEXT)
Field Naturalists' Routes numbered in circles
A.D.H. del.
NEW SOUTH WALES
Murray
River
Darling R
WENTWORTH
YELTA
MILDURA
12
Kulnine
Lower Kulnine
Neds Corner
Well vegetated with Eucalyptus, Callitris, Myoporum, Cassia, Fusanus, Epa
Eremophila, Pittosporum, Acacia
Dodonea, Beyeria, Hakea, Grevillea
tall Casuarina &c
Tank
High Sandhills
Hakea, Grevillea, dwarf Casuarina,
Dwarf pine, Eucalyptus, Fusanus
Epacrideae,
Exocarpus
Triodia &c
Northern Desert
HATTAH
EUSTON
Murrumbidgee
STAWELL
MARYBOROUGH
Lonsdale
Wartook
GRAMPIANS
ARARAT
Glenelg R
SOUTH
11 in.
12 in.
13
141°
142°
143°
34°
37

THE MALLEE
(FOR REFERENCE, SEE TEXT)
Field Naturalists' Routes numbered in circles
A.D.H. del
NEW SOUTH WALES
SOUTH AUSTRALIA
Murray River
Darling R.
Wentworth
Yelta
Mulcra
Merbein
MILDURA
Well vegetated with Eucalyptus
Euston
Murrumbidgee
Narrung
Riverina
Northern Desert
Including small patches of good but waterless land
Hattah
Underbool
Tiega
Ouyen
Murrayville
Pinaroo
Cow Plains
Nyah
West
Chillingollah
Swan Hill
Tyrrell
Tiff
Sea Lake
Boga
Lake Charm
Lake Tyrrell
Kerang
Pine Plains
Bambrook
Central Desert
Waterless tract including little good land
Hopetoun
Coorong
Coyura
Albacutya
Rainbow
Birchip
Pullut
Tullyvea
Red Bluff Well
Lake Hindmorsh
Jeparit
Charlton
Buloke
Donald
Wedderburne
Swanhater
St Arnaud
Dimboola
Wail
Little Desert
Murtoa
Horsham
Dunolly
Goroke
Mortlet
Boorooppa
Narracoorte
Stawell
Maryborough
Glenelg R.
Grampians
Ararat
Lonsdale
Serviceton
Border Town
Tatiara

MAP.

Numbers in circles are referable to the above list of prior papers.
An undulating line divides the desert mallee, approximately, from the better part, and both of these from the rest of the State.
Annual rainfall averages are figured within the left-hand margin, and the respective isohyetose lines are broken.
The scale of the map is about 28 miles to 1 inch.

MUTTON-BIRDS.—In my paper, "Further Notes on Mutton-birds" (*Vict. Nat.*, March, 1912, xxviii., p. 206), which I read at one of our meetings some two years ago, I spoke of the exaggerated accounts of so-called cruelty to the Mutton-birds at Phillip Island, and pointed out that the presence of barbed-wire fences was the primary cause of the numerous deaths and woundings of the birds. After the meeting two members questioned my statement, and said that dead birds had been found lying in heaps as evidence of cruelty, and that large quantities of bones were scattered about, pointing to former slaughter. I am now in a position to say that errors have crept into these statements also. The heaps of birds spoken of were killed outright to obtain "beak oil," and were all young birds. This product is used medicinally, and is much more expensive than the "bird oil," which is obtained by boiling down the birds. With reference to the quantities of bones lying about, the explanation is interesting. Some few years ago at nesting time an extensive sand-drift took place at the rookeries, and covered up a large number of the holes, smothering the nesting birds. During recent years the sand drifted in the opposite direction, laying bare the old rookeries and revealing the bones of the smothered birds.—JOSEPH GABRIEL. 8th December, 1913.

[Fine series of views of the Mutton-bird rookeries, &c., at Phillip Island, were published in the *Leader* of 13th December, 1913, and *Weekly Times* of 3rd January, 1914.—ED. *Vict. Nat.*]

TOURIST MAPS.—Two new tourist maps have recently been issued by the Lands Department. That of Lorne is entirely new, and it is the first time that the environs of that picturesque watering-place have been mapped. It is on the generous scale of half a mile to an inch, and gives the coast line from Airey's Inlet to the Cumberland River, a distance of about 15 miles. The tracks to all the beauty spots are marked, while on the other side of the folder illustrations are given of some of the falls and other features of the district, together with descriptive letter-press and the mileage to various points. The second map is a new edition of the Healesville-Warburton plan, and one side of this sheet is also devoted to descriptive letter-press and illustrations, making it a very useful companion when visiting the Upper Yarra district. It is on the scale of 1 mile to 1 inch,

and embraces the area from Lilydale to Marysville and from Toolangi to Britannia Falls, more than 500 square miles. In fact, it is rather too comprehensive, as no tourist requires a detail map of the whole of that area at one time. Issued in three or four maps, overlapping, it would be found much handier for use when in the bush, as to follow the new Warburton to Marysville track successfully would require frequent references both to map and letter-press. However, the Lands Department is to be thanked for the care taken to indicate all the places of interest in the wide area dealt with, though why "Fern Gully" should be inserted near the head of Fisher's Creek, south of Narbethong, when practically every stream shown on the map is more or less a fern gully, each one claimed to be the best in Victoria, appears somewhat superfluous.

Forestry in Switzerland.—An article in the *Kew Bulletin*, No. 7, 1913, entitled "A Visit to the Forests of Switzerland," by Mr. W. Dallimore, one of the staff of the Royal Botanic Gardens, Kew, gives some idea of the attention paid to forestry in that country. The forests belong to several bodies—some to the Federal Government, some to States or Cantons, some to towns, others to private individuals—but all are subject to periodical inspection by Government inspectors, in order to ensure correct methods of management, for in many cases the existence and prosperity of towns and villages depend almost entirely upon steep mountain slopes being clothed with trees, so as to provide wood for manufacturing purposes and fuel for household use. When it is noted that the Inspector-General of Forests, Dr. J. Coaz, is now in his ninety-second year, and still able to take a tramp of several hours' duration, it will be seen that Switzerland believes in letting well alone when a good man fills a position.

"Some Familiar Wild-Flowers" is the title of a booklet of reproductions of photographs of New South Wales wild-flowers by (Mrs.) Annie E. Sulman. It contains sixty-five plates (about 3 inches by 5 inches), figuring sixty species. In some cases fruiting specimens have been photographed as well as flowers. Taking into consideration the difficulties of the task, the result is in most cases excellent, notably with *Sprengelia incarnata*, *Epacris microphylla*, *Banksia ericifolia*, and *Callicoma serratifolia*. In addition to the specific name, the popular name is given in many cases, and, the colours of the flowers being specified, further interest is created in the illustrations. The booklet is well printed, and is sold at 2s. 6d. Should the effort be appreciated by the public, it is proposed to issue another selection at an early date. A second volume of "A Popular Guide to the Wild-Flowers of New South Wales," by Miss F. Sulman, recently noticed in these pages, is also in course of preparation.

The Victorian Naturalist.

Vol. XXX.—No. 10. FEBRUARY 5, 1914. No. 362.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 12th January, 1914. Mr. F. Pitcher, one of the vice-presidents, occupied the chair, and about 40 members and visitors were present.

CORRESPONDENCE.

A letter was received from the secretary to the Hon. the Premier, forwarding a copy of a letter received from the Agent-General for Victoria in London, giving the result of his interview with the Right Hon. the Secretary of State for the Colonies in connection with the Plumage Bill which will shortly be brought before the House of Commons, requests having been made by this Club, as well as other kindred societies, urging the passing of the bill in the interests of bird protection. The Hon. Mr. M'Bride stated that Mr. Secretary Harcourt informed him that he was quite in sympathy with the measure, and that he has already been interested in the institution of ordinances in various Crown colonies prohibiting the destruction of insectivorous and other birds. Mr. Harcourt added that he would be very pleased to bring the matter under the notice of his colleagues, the members of the Government.

Mr. Keartland said it was desirable that legislation should be enacted to stop the destruction of our native birds, but legislation was of little use unless carried out. Laws were often more honoured in the breach than the observance.

Mr. J. Gabriel also spoke in support of the question.

REPORTS.

A report of the excursion to Sandringham on Saturday, 13th December, was given by the leader, Mr. J. Shephard, who said that about fifteen members met at Sandringham railway station. A start was at once made for the beach, which was traversed in the direction of the Red Bluff. The tide was fairly high, but ebbing, and when Half-Moon Bay was reached the rocks at the southern extremity were fairly accessible. This stretch of beach is much resorted to by the growing population, and this partially accounts for the paucity of marine shore fauna. A stranded shoal of sting-rays was noticed, as well as the continued extension along the rocks of the European mussel. At Half-Moon Bay some time was spent among the anemones, barnacles, planarian worms, starfish, periwinkles, washed-up corals, crustaceans, &c., found among the rocks and

pools. The theoretical side of zoology received attention in a brief discussion on the affinities of the Cœlenterates, anemones and corals being instanced as similar animals, but, owing to the absence of hard parts in the former, and the presence of a varied calcareous framework in the latter, the two were of very differing capacity to leave a fossiliferous record of former species. The weather was extremely pleasant, and the party appeared to appreciate the opportunity for "nature-study" under such agreeable conditions.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. Edward Armytage, "Holm Park," Beaconsfield, and Mrs. Olga Ernst, State school 1,028, Scoresby, were duly elected country members of the Club.

GENERAL BUSINESS.

Dr. T. S. Hall said that about six years ago the Club was instrumental in getting certain railway cuttings (*Vict. Nat.*, xxiv., p. 158, Feb., 1908) preserved for geological study, and asked the railway authorities to erect notice boards on the cuttings in question, but these have not been erected, and some of the cuttings have since been planted, thus rendering them useless for geological study. He urged that the committee should take steps to secure the remaining sections from obliteration.

Mr. F. G. A. Barnard said that at the time the Commissioners objected to notice boards being erected in the cuttings as they might cause persons to trespass in order to read the wording on the boards.

Mr. G. A. Keartland said that the Department of Education might be asked to co-operate with the committee, and he thought the matter should be brought under the notice of the Hon. the Premier.

Dr. Hall said that Mr. Keartland's suggestion was a good one, and the co-operation of kindred societies would strengthen the Club's hands.

Mr. G. Coghill moved—"That kindred societies be invited to join with the Club in forming a deputation to wait on the Railways Commissioners urging the preservation of these cuttings and the erection of notice boards thereon." The resolution was seconded by Mr. H. Whitmore, and carried unanimously.

PAPERS READ.

By Messrs. J. H. Gatliff and C. J. Gabriel, entitled "List of Recent Victorian Brachiopoda."

The authors stated that a list of recent Victorian Brachiopods, comprising five species, had been published by Mr. A. H. S. Lucas, M.A., in the "Proceedings of the Royal Society of

Victoria" in 1890. Since that time four additional species had been recorded for Victorian waters. There had been several changes in nomenclature, and the Victorian species were now listed as *Terebratulina cancellata*, Koch; *T. cavata*, Verco; *T. radula*, Hedley; *Magellania flavescens*, Lamarck; *Magasella vercoi*, Blockmann; *M. cumingi*, Davidson; *Kraussina atkinsoni*, Ten.-Woods; *K.* (*Mergerlina*) *lamarckiana*, Davidson; *Cryptopora brazieri*, Crane, the full synonomy of each species being given. Specimens of each species were exhibited in illustration of the paper.

Some additional notes on the position and habits of the group were also read, and specimens distributed for closer examination.

Dr. T. S. Hall said that the authors were to be congratulated on their work. The Brachiopoda or lamp shells were very difficult to determine, from the fact that the differentiation of species was founded on loops contained within the shell, there being no external characters sufficiently constant by which to separate them. It was also difficult to separate young examples from older individuals.

Messrs. F. Chapman, J. Gabriel, and F. Pitcher also spoke.

Mr. C. J. Gabriel said that though they had recorded only nine species of the order, it was not to be concluded that they had not done much work, or that they had discovered all the species that may exist. These results were obtained only after much laborious work and expense.

Mr. Gatliff said when one finds the young, smooth form attached to a bunch of more mature ones on the sea-shore one cannot make a mistake in concluding that the smooth form is but the older one in a younger stage of its existence.

NATURAL HISTORY NOTES.

Mr. C. French, jun., said that he had recently received a specimen of the large carab beetle, *Catadromus australis*, from Mr. A. Coles, of Bourke-street, to whom it had been forwarded by Mr. F. E. Van Damme, of Outtrim, with the remark:—"Am sending you a beetle, the name of which I would like to know. The other day I heard a frog croaking most piteously, and thinking a snake had it, I went to see, when I found this beetle hanging on to it."

Mr. F. Chapman, A.L.S., read an interesting note regarding the feeding of a young cuckoo by a pair of White-plumed Honey-eaters.

Dr. T. S. Hall, referring to a recent publication on "The Edible Fishes of Queensland," by Mr. Douglas Ogilby, said that the Blackfish, *Gadopsis marmoratus*, was recorded therein as being found in Queensland. It was formerly thought that

the Blackfish was confined to Tasmania and Victoria; it had since been found in New South Wales and South Australia, and now in Queensland. In his opinion the Blackfish originated in the great river that flowed into the sea before Bass Strait was formed. The fish was formerly classed among the Breams, but is now placed in the Perch family. Though the variations of the fish are very great, there is only one species.

Mr. A. D. Hardy asked Dr. Hall if there was any evidence which would show the Blackfish to have been at one time a sea fish. Dr. Hall said the evidence was conclusive that the fish had been distributed by stream capture.

Messrs. Keartland and Searle also spoke.

EXHIBITS.

By Mr. F. G. A. Barnard.—Growing plant of *Drimys aromatica*, Native Pepper.

By Mr. F. Chapman, A.L.S.—Five species Tertiary Brachiopod shells from Victoria—*Magellania grandis*, T.-Woods, sp.; *Magellania garibaldiana*, Davidson, sp.; *Magellania insolita*, Tate, sp.; *Magasella compta*, Sow., sp.; and *Terebratula tateana*, T.-Woods. Also specimens of the Winter or Evesham Moth, *Cheimatobia brumata*, from Fulham, England.

By Mr. J. E. Dixon.—Forty-three species of Coleoptera collected during December, 1913, at Heywood and Portland.

By Messrs. J. H. Gatliff and C. J. Gabriel.—All of the nine species of Victorian Brachiopods named in the paper. Other Australian and exotic species—*Liothyris sphenoidea*, Phil., *Terebratulina radiata*, Rve., *T. caput-serpentis*, Lin., *Magellania californica*, Koch., *M. lenticularis*, Desh., *Terebratella rubricunda*, Sol., *T. transversa*, Sowb., *T. cruenta*, Dillw., *Magasella jaffaensis*, Bloch, *Megerlia truncata*, Lin., *M. sanguinea*, Chem., *Kraussina rubra*, Pallas, *Laqueus rubellus*, Sowb., *Rhynconella psittacea*, Chem., *R. nigricans*, Sowb., *Lingula anatina*, Lam., *Lingula* (*Glottidia*) *albida*, Hinds. Also fossil Brachiopoda from Muddy Creek, near Hamilton.

By Mr. F. Pitcher.—Crested forms of Gristle Fern, *Blechnum cartilagineum*, Swartz. Collected by the exhibitor at Myers Creek, Healesville, 26th December, 1913.

By Mr. Searle.—Pyrosoma from Bass Strait. A group of the Tunicata, connecting the Ascidians with Salpa and Doliolum; when living these animals are luminous.

By Mr. P. R. H. St. John.—Herbarium specimens (showing various stages of growth) of *Eucalyptus Kitsoni*, Luehmann and Maiden. Collected by Dr. Heber Green, at Foster, South Gippsland, 3rd January, 1914.

After the usual conversazione the meeting terminated.

SUPPLEMENTARY NOTES ON THE MALLEE FLORA.

By A. D. HARDY.

SINCE the publication of the paper, "The Mallee: Ouyen to Pinaroo—Botanical Notes" (*vide Vict. Nat.*, vol. xxx., No. 9, January, 1914), additional names adopted by the Plant Records Committee have reached me through the National Herbarium, and these may be used to fill all or nearly all of the blanks in the middle column of the systematic list. My attention has been drawn to the difficulty experienced by many country and other members of the Club who, without easy access to the necessary literature, fail to recognize certain species where the names differ from those of Baron von Mueller's "Key to the System of Victorian Plants." In a list of equivalents below will be found a number of the omitted names. Opportunity is now taken to correct a few errors which crept in through proofs having been read in the country during the New Year holiday, when reference books were out of reach.

Altered or Modified Classification.—The large order Leguminosæ—undivided in the "Key"—is divided and subdivided in Bentham and Mueller's "Flora Australiensis" into sub-orders: Papilionaceæ, Cesalpinieæ, and Mimoseæ, and these, again, into various tribes. The three sub-orders are represented in the Mallee, and in my list the word Cesalpinieæ should have been inserted so as to include the two species of Cassia. The order Salsolaceæ is now known as Chenopodiaceæ, and Asperifoliæ as Borragineæ. Rhizospermeæ should have been placed after Gramineæ.

ERRATA.

For *Atriplex semibaccatum* read *Atriplex semibaccata.*
For *Bæckea ericacea* read *Bæckea ericæa.*
For *Senecio magnificum* read *Senecio magnificus.*
For *Ericaceæ* read *Epacrideæ.*
Helichrysum cymosa should be omitted, this being the name of a South African species, and entered inadvertently.

ADDITIONAL NAMES.

Cassytha glabella	Tangled Dodder-laurel
Eriostemon sediflorus	Desert Phebalium
Nitraria Schoberi	Nitre-bush
Atriplex halimoides	Dwarf Salt-bush
Chenopodium microphyllum, F. v. M.	Small-leaved Goosefoot
Acacia calamifolia	Reed-leaved Acacia
Eucalyptus incrassata	Giant Mallee
Eucalyptus Behriana	Bull Mallee
Eucalyptus bicolor, A. Cunn. ...	Black Box
Calytrix tetragona	Common Fringe-myrtle
Grevillea ilicifolia	Holly Grevillea
Nicotiana suaveolens	Austral Tobacco
Lycium australe	Austral Box-thorn
Prostanthera chlorantha	Green Mint-bush
Myoporum platycarpum	Sugar-wood
Styphelia Sonderi	Flame-heath
Astroloma humifusa	Cranberry-heath
Callitris robusta	Murray Pine or Marong
Triodia irritans	Porcupine-grass or False Spinifex.

SYNONYMS, &c.

Eriostemon sediflorus, F. v. M. = Phebalium glandulosum, Hook.
Acacia runciformis, A. Cunn. = Acacia lineata, A. Cunn.
Eucalyptus gracilis, F. v. M. = Eucalyptus calycogona, Turcz.
Helichrysum lucidum, Henck. = Helichrysum bracteatum, Willd.
Styphelia Sonderi, F. v. M. = Astroloma conostephioides, F. v. M.
Styphelia humifusa = Astroloma humifusum, R. Br.
Calycothrix, Meissn. = Calytrix, Meissn.

NOTE.—*Eucalyptus incrassata*, var. *dumosa*, is accepted by the Government Botanists of Victoria and New South Wales as the correct name of the plant elsewhere called *Eucalyptus dumosa* and appearing as such on official maps of Victoria.

HONEY-EATER AND CUCKOO.*—A cuckoo fledgeling, *Cuculus inornatus*, which had fallen from a gum-tree in the garden, was placed in a cage that was handy, and an attempt made to feed it artificially. The most tempting pieces of worms and insects pushed between the beaks failed to create an appetite in the little waif, possibly because of the lack of the requisite bird-like touch. In a few hours, after some impetuous chirps from the Cuckoo, a couple of White-plumed Honey-eaters, *Ptilotis penicillata*, which had already shown signs of distress when the young bird was found, made their appearance. Carrying worms and insects in their beaks, the little honey-eaters made several unsuccessful dashes at the cage in the endeavour to enter. The young cuckoo was then taken out and placed on the flat top of the cage, where it was shaded by a creeper. The next moment the pair of honey-eaters commenced a series of journeys to and fro, rapidly consigning fresh tit-bits to the open mouth of the young cuckoo, and this process lasted for about an hour at a time. On the third day the cuckoo died, probably from exposure, for, although there was material for warmth in the cage, the nights were unseasonably cold. The boldness of the honey-eaters during their self-imposed task was very striking, for a camera was brought into action during the feeding process at disances of 2 feet 6 inches and even 1 foot 6 inches. Jesse, in his interesting "Gleanings in Natural History," states that parent birds will often follow their young to the cage in which they may have been placed, and there feed them with the greatest constancy. The same author also notes the peculiar instinct which leads the English cuckoo to choose the nest of a smaller bird than itself in which to lay its egg, presumably that the fledgeling may not be overmastered when the rightful owners of the nest are hatched, and further notices the perspicacity of the bird in selecting a nest of a bird with similar insectivorous tastes.—F. CHAPMAN. Balwyn, 12th January, 1914.

* When reading this note the fledgeling was supposed to be a young thrush. On showing a photograph of the young bird, however, to Mr. Keartland, he recognized it as a Pallid Cuckoo.

NOTES ON THE LICHEN-FLORA OF VICTORIA.

(With Plate.)

BY R. A. BASTOW.

(*Read before the Field Naturalists' Club of Victoria, 10th Nov.*, 1913.)

IT is highly probable that we have all seen Ferntree Gully. We have wandered along its shady walks, and under its umbrageous foliage, in the sweetly-scented and cool shade of its trees and bushes. It is delightful, and fills one's heart with content and joyful anticipation of when, at our ease at home, we examine our collections—gems from the bark, off the ground, off the clay, or off the rocks—

> "God made them all;
> And what He deigns to make
> Should ne'er be deemed
> Unworthy of our study and our love."

Then we will suppose we are there—in Ferntree Gully—with the trees covered with lichens all around us. Look where we will we see them—little specks of yellow, white, red, and black, small lumps on the bark of the trees like little warts, for λειχην (leikeen) is the Greek name for wart. But they are not always like warts; sometimes they take the form of writing. I have specimens of this with me, and really they look more like Arabic than anything else; but, of course, it just grows on bark, as you may see, and really those Arabic letters are the fruit of the plant. All the Graphideæ are fruited in this manner. The fruits are called lirellæ—sometimes with a margin on them and sometimes without margin. I have also brought a talipot palm book with me, so that you may compare the writing with the Graphis fruit. Sometimes the lichen plant takes the form of fronds, and at other times the plants resemble a bunch of yellowish-green filaments, as in Usnea, the Beard-Moss.

Some German botanists hold the opinion that lichens are a union of algæ and fungi, and their reasons for the faith within them are good, for, in examining the lichens closely, we are strongly reminded first of fungus and then of alga; but Leighton calls this theory—the Schwendenerian theory—"the baseless fabric of a vision." "Anyhow," says Leighton in his introduction to "The Lichen-Flora of Great Britain," "the group of lichens is so distinct in its vegetative characters, and at the same time so extensive and varied a one, that it seems more methodical to treat it, as heretofore, as a distinct class than to absorb it in that of fungi, notwithstanding the close affinity shown by its reproductive organs."

The lichens are usually divided into the filamentous, the foliaceous, and the crustaceous. The filamentous forms a shrub-like mass as in *Usnea barbata*; the foliaceous is generally in fronds, as in Ramalina; and the crustaceous is almost one

with the rock or tree on which it grows, as in *Lecidea geographica* and in Graphis.

The apothecium is the principal character of the lichen. It is the fruit, and "by their fruits ye shall know them." If, with a sharp knife, we cut across an apothecium, we shall find the spore-sacs, or thecæ, nestled in the midst of a number of paraphyses or upright filaments, and the tops of these filaments form the top or coloured part of the apothecium (fig. 112). They may be white, red, black, yellow, or brown, and the colour is a specific character; but the most important specific character is the shape and colour of the spores contained in the spore-sac or theca. The spore may be one-celled, two-celled, or many-celled, and with the colour it is very characteristic.

Sometimes a difficulty is found in identifying the spores. They may have been all shot out during a shower, but, as a rule, they may be found, if looked for diligently. They are hard and glassy, and cannot well be mistaken for anything else than spores; but have a care lest they are fungus spores. Many a time have my dreams been dispelled, when I found a curious spore, when I was informed that it was only a fungus spore. I had to go back and find the spore, in which, as a rule, I succeeded. This is the point where the slogging comes in—*i.e.*, close application to the subject in hand.

The spores are of various forms—some are elliptic, some are long and narrow, some are crescent-shaped, and some are very minute and round. The colours are also most important. They may be hyaline or clear, or fuscous (light brown), and a little dilute iodine often reveals forms that would otherwise remain invisible. I recommend a good $\frac{1}{4}$-inch objective for spore-hunting. The part of the apothecium examined should be absolutely powdered with a knife in a drop of water on a glass slip. The theca or spore-sac must be burst, then the spores are let out, and can be distinctly observed.

Some lichens much resemble sheep's dung both in colour and form—the genus Heterodia, for instance (fig. 31); but if the plant is immersed in water for a few minutes it opens out in beautiful green fronds. This plant is found amongst the grass near Kew Asylum.

I shall never forget one little episode at Ferntree Gully. I arranged with a very particular friend to return home by the 6 p.m. train, and so, being hungry and tired, we had a cup of tea at the kiosk, and, having a half-hour to spare, we observed a fallen tree. This was a glorious opportunity to collect, and we were soon at its side. We just revelled amid the lichens, and obtained a number of them; then, looking at my watch, I called out to my companion, Mr. Wilson, and shouted, "Come on, let's run for it!" but, as we were soon out of

breath, the train passed out of the station at one end as we passed in at the other. I had broken my word, and was disgusted with myself. However, we had two hours more to wait for the next train, and utilized the time by walking up to the boundary fence, where I collected the beautiful little Anzia and also Calopisma. Wilson smiled at me as I sat ruminating about someone "nursing their wrath to keep it warm"; but I had a return smile at him as he shook hands with me. He intended getting out at Richmond. He stood waiting at the carriage door to get out, but the train passed on, and so did he. "Why did you not get out?" said I. "Can't you see?" said he. I smiled. We had a splendid and most enjoyable day.

If we tear a frond of lichen across, we shall find a leathery, impervious, cortical layer at the top, and a bright green gonidic layer, and after that a white, spongy, medullary layer. The so-called alga cells are found in the green gonidic layer, and they appear to play an important part in the economy of the plant. In fact, Fries, no mean authority, defines lichens as "algæ born in the air, and interrupted in their development by the deficiency of water and stimulated into forming a nucleus by light."

The accepted reproductive system of lichens is in the apothecium. This contains the spores, and by their germination and subsequent development the species is reproduced.

The spermogenes (fig. 10), which discharge at certain periods minute bodies called spermatia, are now generally acknowledged to be the male organs, resulting in fertilization.

The pycnides do not yet seem to be well understood, but I learn that they may be superficial spermogenes.

The spermogenes are ripe before the development of the apothecium, and must be looked for in the form of black, point-like bodies scattered on the thallus or outer layer. It must be distinctly understood that no positive proof has as yet been obtained as to the fecundating influence of spermatia on the spores, but it appears to be highly probable.

About twelve years ago I made a collection (generic only) of lichens of Victoria; they are laid on the table for exhibition, and please note that if the margin of the apothecium is the same colour as the thallus—*i.e.*, the outer layer—then the plant is leconarine; but if the margin is diverse in colour from the thallus, then the plant is lecideine. This distinction is necessary in using the diagnosis. All the lichens on exhibition have passed through the late Rev. F. R. M. Wilson's hands, and the pencil notes on them are in his own handwriting. They remind me of the many pleasant rambles we took at Macedon, Braybrook Junction, Warburton, Black Spur, Fernshaw, Lakes District, Sorrento, &c.

Specimens are easily preserved. They simply need wrapping in paper, with the date and locality written legibly thereon.

I have thought that the publication of a short synopsis of the characters of our Victorian lichens, arranged in the form of a systematic list, based on the work of the late Rev. F. R. M. Wilson, may be of value to students of these lowly plants, while on the accompanying plate will be found figures of all the more important species, in which every genus mentioned is represented; in many instances variously enlarged drawings of the spores are included.

DIAGNOSTIC CHARACTERS OF THE ORDERS, TRIBES, AND GENERA OF LICHENS FOUND IN VICTORIA, adapted chiefly from "Bulletin de le Herbina," Boissier, vol. ii., 1894, by REV. F. R. M. WILSON.

ORDER I.—COLLEMACEÆ.

Substance of thallus gelatinous when moistened, gonidia variously gonimial, apothecia generally gymnocarpous, epithecium and asci persistent.

TRIBE 1.—EPHEBEÆ.

Thallus filiform, branched; gonidia in transverse strata.

1. *Ephebe.* Apothecia endocarpoid.

TRIBE 2.—LICHINEÆ.

Thallus fruticulose; gonidia sub-nostichoid, concatenated; apothecia terminal, lecanorine.

2. *Lichina.* Spores simple.

TRIBE 3.—COLLEMEÆ.

Thallus foliaceous; gonidia concatenated; apothecia superficial, lecanorine or sub-biatorine.

a. Epithallus either not cellular or confusedly cellulose.

3. *Physma.* Spores simple.
4. *Synechoblastus.* Spores transversely divided.
5. *Collema.* Spores parenchymatic.

b. Epithallus of polygonal cells in one stratum.

6. *Leptogium.* Spores parenchymatic, both transversely and longitudinally divided.

TRIBE 4.—PYRENOPSIDEÆ.

Thallus crustaceous; gonidia chroolepoid: apothecia lecanorine.

7. *Pyrenopsis.* Gonidia rubricose; spores simple.
8. *Lempholemma.* Thallus tremeloid, membranaceous; spores simple.
9. *Synalissa.* Thallus encrusting; gonidia in globular sacs; spores simple.

ORDER II.—EPICONIACEÆ.

Thallus not gelatinous; gonidia various; apothecia gymnocarpous; asci and epithecium soon vanishing, leaving the spores nude and pulveraceo-aggregate.

TRIBE 5.—CALICIÆ.

Thallus crustaceous, rarely none; gonidia palmellaceous.

10. *Sphinctrina.* Apothecia pyriform; parasitic on other lichens; spores simple, fuscous.
11. *Coniocybe.* Apothecia turbinate, stipitate; apothecium coloured; spores simple, fuscous, hyaline, or light-coloured.
12. *Chænotheca.* Apothecia turbinate, stipitate; spores simple, fuscous.
13. *Calicium.* Apothecia turbinate, stipitate; spores transversely divided, fuscous.
14. *Pyrgillus.* Apothecia truncato-conical, hollow, filled with the transversely-banded fuscous spores.
15. *Acolium.* Apothecia sessile; spores transversely divided.

TRIBE 6.—SPHÆROPHOREÆ.

Thallus podetially fruticose, solid; gonidia globose, green, palmellaceous; apothecia terminal.

16. *Sphærophoron.* Spores simple, sub-globose, fuscous.

ORDER III.—DISCOCARPEÆ.

Thallus not gelatinous; gonidia various; apothecia gymnocarpous; epithecium manifestly persistent with parallel thecæ.

SERIES I.—DIPLOBLASTÆ.

Thallus of two parts, the podetia fruticulose, sub-erect, and the rest squamoso or crustaceo-horizontal; gonidia palmellaceous, apothecia terminal on podetia: spores hyaline.

TRIBE 7.—BŒOMYCEÆ.

Podetia solid, nude or squamose, never leafy, short, sometimes almost none.

17. *Gomphillus.* Thallus woolly, gonidia and filaments irregularly conglutinate; apothecia briefly stipitate; spores filiform, multipartite.
18. *Bœomyces.* Spores simple.

TRIBE 8.—THYSANOTHECIÆ.

Podetia with external striate chondroid stratum, externally stuppeous (woolly).

19. *Thysanothecium.* Spores simple.

TRIBE 9.—CLADONIEÆ.

Podetia fistulose, nude, or with foliaceous scales; spores simple.

20. *Cladonia.* Chondroid stratum of podetia inside of gonidial zone.

21. *Clathrina.* Chondroid stratum of podetia outside of gonidial zone; podetia variously perforated.

TRIBE 10.—STEREOCAULEÆ.

Podetia solid, adorned with fragile granules of various forms.

22. *Stereocaulon.* Spores transversely divided.

SERIES II.—THAMNOPHYLLOBLASTÆ.

Thallus fruticulose, terete, and compressed or foliaceo-expanded, erect, ascending or horizontal, variously affixed, never closely, and widely attached to the substratum; no podetia.

TRIBE 11.—SIPHULEÆ.

Thallus podetiiform or compressed, solid; gonidia palmellaceous; apothecia unknown.

23. *Siphula.* Spores unknown.

TRIBE 12.—THAMNOLIEÆ.

Thallus podetiiform, fistulose; apothecium lateral in stromata.

24. *Thamnolia.* Spores simple.

TRIBE 13.—USNEÆ.

Thallus cylindrical, terete or rarely angulose, solid, central axis tractile, surface fibrillose; gonidia palmellaceous; apothecia terminal, lecanorine, plano-peltiform from the beginning.

25. *Usnea.* Spores simple, hyaline.

TRIBE 14.—RAMALINEÆ.

Thallus cylindrical or compressed or foliaceous, erect or ascending, everywhere corticate, nowhere rhiziniferous; gonidia palmellaceous: apothecia lateral or spuriously terminal under deflexed apex, at first concave.

26. *Evernia.* Spores simple, hyaline.
27. *Ramalina.* Spores two-locular, hyaline.
28. *Theloschistes.* Spores orculiform, hyaline.
29 *Anaptychia.* Spores two-locular, fuscous.

TRIBE 15.—GYROPHOREÆ.

Thallus horizontally foliaceous, umbilicato-affixed at the centre; gonidia palmellaceous; apothecia lecideine often gyrose plicate.

30. *Gyrophora.* Spores simple, hyaline.

TRIBE 16.—HETERODIEÆ.

Thallus horizontal foliaceous, affixed with rhizinæ, beneath tomentose; gonidia palmellaceous; apothecia marginal, biatorine.

31. *Heterodium.* Spores simple, hyaline.

TRIBE 17.—PELTIGEREÆ.

Thallus horizontal, broadly foliaceous, affixed with rhizinæ; apothecia immarginate and plane; spores eventually fuscous, transversely divided.

a. Apothecia adnate on lower surface of thallus.

32. *Nephromium.* Thallus with glomurelose cærulescent gonidia.
33. *Nephroma.* Gonidia palmellaceous.

b. Apothecia on upper surface of thallus.

34. *Peltigera.* Thallus with glomurelose cærulescent gonidia; apothecia on marginal apex of lobes.
35. *Endocarpiscum.* Apothecia endocarpoid.

TRIBE 18.—PARMELIEÆ.

Thallus horizontal, mono-centrico foliaceous, but variously and commonly profoundly divided, nearly always clothed beneath; apothecia marginal, and, at least when young, lecanorine and concave.

a. Thallus villous-tomentose beneath, commonly bearing cyphellæ or pseudo-cyphellæ; spores fusiform, transversely divided, from hyaline at length fuscous.

36. *Stictina.* Thallus gonimic; granules blue-green, without cellular membrane.
37. *Sticta.* Thallus gonidic; granules green or yellow, with cellular membrane.

b. Thallus hirsute or villose beneath; gonidia palmellaceous: spores ellipsoid.

38. *Parmelia.* Spores simple, hyaline; paraphyses conglutinate, elements clothing under surface discrete, rarely none.
39. *Anzia.* Spores simple, hyaline: elements clothing under surface anastomosing and forming spongy masses.
40. *Zanthoria.* Spores orculiform, hyaline; paraphyses free.
41. *Physcia.* Cortex minutely iso-diametrico cellulose; spores transversely divided, fuscous.

TRIBE 19.—PYXINEÆ.

Thallus horizontal mono-centrico foliaceous, deeply divided, clothed beneath with short rhizinæ; apothecia black, lecideine.

42. *Pyxine.* Spores transversely divided, fuscous.

TRIBE 20.—PSOROMEÆ.

Thallus polycentrico-squamose or laciniose, or squamose, sub-horizontal, clothed beneath; gonidia palmellaceous; apothecia lecanorine, constricted at the base; spores often somewhat rough in the outline.

43. *Psoroma.* Spores simple, hyaline.

TRIBE 21.—PANNARIEÆ.

Thallus mono-centric, radiately laciniose or squamose, sub-depressed, with a blue hypothallus; gonidia glomerulose-nostochaceous; apothecia lecanorine; spores somewhat rough in the outline.

44. *Pannaria.* Spores simple, hyaline.

TRIBE 22.—PARMELIELLEÆ.

Thallus, gonidia, and spores as in *Pannaria*, but apothecia lecideine or biatorine.

45. *Parmeliella.* Apothecia when young concave, with prominent margin.

46. *Coccocarpia.* Margin of apothecia obsolete, disc plain from the beginning.

TRIBE 23.—PHYLLOPSOREÆ.

Thallus microphylline, squamulose, variously clad beneath, somewhat laxly affixed; gonidia palmellaceous; apothecia lecideine or biatorine.

47. *Phyllopsora.* Spores simple, hyaline.

SERIES III.—KRYOBLASTÆ.

Thallus crustaceous, amorphous or radiately divided or squamulose, always closely and widely attached to the substratum, squamules ascending at the margin only; the lower surface is unclad; podetia none.

TRIBE 24.—PSOREÆ.

Thallus discreto-squamulose, or radiato-effigurate at the circumference, everywhere closely attached to the substratum, or as squamules ascending at the margin; gonidia palmellaceous; apothecia lecideine.

48. *Psora.* Spores simple, hyaline.

49. *Thalloidina.* Spores transversely divided, hyaline.

TRIBE 25.—PLACODIÆ.

Thallus adnato-squamulose or radiosa-effigurate at the circumference; gonidia palmellaceous; apothecia lecanorine.

a. Paraphyses conglutinate.

50. *Plazodium.* Spores simple, hyaline.

b. Paraphyses free.

51. *Amphiloma.* Spores orculiform, hyaline.

52. *Candalariella.* Spores two-locular, hyaline.

TRIBE 26.—LECANOREÆ.

Thallus amorpho-crustaceous; gonidia palmellaceous; apothecia lecanorine (girt with thalline margin).

a. Apothecia nude, marginated.

53. *Lecanora.* Spores simple, hyaline.

54. *Lecania.* Spores transversely divided, hyaline.
55. *Calopisma.* Spores orculiform, hyaline.
56. *Rinodina.* Spores transversely divided, fuscous.
57. *Diploschistes.* Spores parenchymatic, fuscous.

b. Apothecia enclosed in thalline verrucæ; spores simple.

58. *Pertusaria.* Fructiferous verrucæ, closed or lecanorino-open; paraphyses connected; spores with thick, numerously coated epiderm.

c. Apothecia immarginate, immersed.

59. *Phlyctella.* Spores fusiform, transversely divided, hyaline.

TRIBE 27.—LECIDIEÆ.

Thallus amorpho-crustaceous; gonidia palmellaceous; apothecia lecideine (girt with a proper margin diverse from the thallus).

60. *Mycoblastus.* Spores simple, hyaline; paraphyses convexo-ramose).
61. *Lecidea.* Spores simple, hyaline; paraphyses unconnected.
62. *Sphærophoropsis.* Eight ellipsoid spores in theca.
63. *Patellaria.* Spores transversely divided, hyaline.
64. *Blastenia.* Spores orculiform, hyaline.
65. *Heterothecium.* Spores parenchymatic, hyaline; paraphyses not convexo-ramose.
66. *Buellia.* Spores transversely divided, fuscous.
67. *Diplotoma.* Spores four-locular, transversely and longitudinally divided, fuscous.
68. *Rhizocarpon.* Spores parenchymatic, fuscous.

TRIBE 28.—BIATORINOPSIDEÆ.

Thallus amorpho-crustaceous; gonidia chroolepoid; apothecia biatorine, from the first free of the thallus and open.

69. *Biatoriopsis.* Spores transversely divided, hyaline.

TRIBE 29.—BYSSOCAULEÆ.

Thallus of filaments lax and reticulately anastomosing; gonidia depauperato-chroolepoid; apothecia lecanorine.

70. *Byssocaulon.* Spores transversely divided, hyaline.

TRIBE 30.—CÆNOGONIEÆ.

The hyphæ of the thallus separately covering the confervaceo-filiform gonidia and closely adhering to them, and with them forming free filaments, which grow into cushion-like masses; apothecia biatorine.

71. *Cænogonium.* Spores transversely divided, hyaline.

TRIBE 31.—THELOTREMEÆ.

Thallus crustaceous; gonidia chroolepoid; apothecia lecanorine, urceolate, persistently thalline begirt.

72. *Ocellularia*. Spores transversely divided, hyaline, loculi lentiform.
73. *Thelotrema*. Spores parenchymatic, hyaline.
74. *Phæotrema*. Spores transversely divided.
75. *Leptotrema*. Spores parenchymous, fuscous.

TRIBE 32.—GRAPHIDEÆ.

Thallus crustaceous; gonidia chroolepoid; apothecia lirelline (elongated from the orbicular form), margin proper or obsolete.

a. Apothecia scattered on thallus.

1. Margin lecanorine, the inner proper margin rudimentary; loculi of spores cylindrical.

76. *Dirinastrum*. Spores fuscous, otherwise like a lecanore; gonidia chroolepoid.
77. *Platygrapha*. Spores transversely divided, hyaline; paraphyses connected.

2. Proper margin black, opegraphine, locules of spores cylindrical or out of cylindrical parenchymatous.

78. *Opegrapha*. Spores transversely divided, hyaline; paraphyses connected.
79. *Melanographa*. As in Opegrapha, but spores fuscous.
80. *Melaspilia*. Spores transversely divided, fuscous; paraphyses not connected.

3. Proper margin, but sometimes thallinocorticate; locules of spores lentiform or out of lentiform parenchymatous.

81. *Graphis*. Spores transversely divided, hyaline.
82. *Phæographis*. Spores transversely divided, fuscous.
83. *Phæographina*. Spores parenchymatic, fuscous.

4. Margin deficient; locules of spores cylindrical or out of cylindrical parenchymatous; spores often out of hyaline, nigrescent.

(*a*) Paraphyses everywhere intimately connected.

84. *Arthonia*. Spores transversely divided.
85. } *Arthothelium*. Spores parenchymatic.
86. }

(*b*) Paraphyses not connected, growing on thallus and apothecia of other lichens.

87. *Celidium*. Apothecium maculiform; spores hyaline, fourlocular.

88. *Abrothallus.* Apothecium hemispherico - sub-biatorine ; spores solæform, fuscous, two-locular.

b. Apothecia aggregated in stromata.

89. *Chiadecton.* Spores transversely divided, hyaline ; paraphyses intricately connected.
90. *Glyphis.* Spores transversely divided, hyaline, locules lentiform ; paraphyses free.
91. *Sarcographa.* Spores transversely divided, fuscous, locules lentiform ; paraphyses free.

TRIBE 33.—PERIDIEÆ.

Apothecium without perithecium. covered by rimulose dehiscent peridium.

92. *Mycoporum.* Apothecia containing many thalamia conjoined under peridium.
93. *Mycoporellum.*
94. *Asteroporum.*

TRIBE 34.—MYRIANGIEÆ.

Thallus crustaceous ; apothecia turbinato-capituliform. wholly parenchymatico-cellulose ; lamina and paraphyses indistinct, and thence the Arthenoid asci grow close together on the thalamium.

95. *Myriangium.* Spores hyaline.

ORDER IV.—PYRENOCARPEÆ.

Thallus various, but not collemaceo-gelatinous ; apothecia angiocarpous, no distinct epithecium, asci convergent.

TRIBE 35.—ENDOPYRENIEÆ.

Thallus everywhere or at least widely adnato-squamulose ; gonidia palmellaceous.

96. *Endopyrenium.* Spores simple, hyaline.
97. *Normandina.* Spores transversely divided, hyaline.
98. *Endocarpon.* Spores parenchymatic, fuscous.

TRIBE 36.—STRIGULEÆ.

Thallus epiphyllous, plaguliform, closely adnate, radiato-effigurate at the circumference ; gonidia chroolepoid.

99. *Strigula.* Spores transversely divided, hyaline.

TRIBE 37.—PYRENULEÆ.

Thallus amorpho-crustaceous ; gonidia chroolepoid (branching in growth).

SUB-TRIBE 1.—VERRUCARIEÆ.

Apothecia scattered on thallus.

100. *Verrucaria.* Spores simple, hyaline ; paraphyses rudimentary.

101. *Arthropyrenia.* Spores transversely divided, hyaline; paraphyses connected.
102. *Porina.* Spores transversely divided, hyaline; paraphyses free; gonidia discrete.
103. *Polyblastia.* Spores parenchymatic, hyaline; paraphyses connected.
104. *Limboria.* Spores simple, fuscous.
105. *Pyrenula.* Spores transversely divided, fuscous, loculi lentiform.

SUB-TRIBE 2.—TRYPETHELIEÆ.

Apothecia in stromata, straight and erect, coming out in distinct ostioles.

106. *Trypethelium.* Spores transversely divided, hyaline, loculi lentiform.
107. *Melanotheca.* Spores transversely divided, fuscous, loculi lentiform.

SUB-TRIBE 3.—ASTROTHETIEÆ.

Apothecia in stromata, oblique, with common ostiole.

108. *Parmentaria.* Spores parenchymatic, fuscous.

NAMES, &c., OF NUMBERED LICHENS SHOWN ON PLATE.

1. *Ephebe pubescens*, F. R. Engler, p. 155, fig. 75.
2. *Lichina pygmæa.* Grev. Scot. Crypt. T., 219.
3. *Physma compactum* (*Collema*). Kerb., Bulletin de le Herbina, Boissier, vol. 2, 1894.
4. *Synicoblastus leucocarpa*, Tayl. Proc. Roy. Soc. Victoria, 1892, p. 154.
5. *Collema lævis*, Tayl. Proc. Roy. Soc. Victoria, 1892, p. 152.
6. *Leptogium tremelloides*, L. Hepp's collection, National Herbarium, Melb.
7. *Pyrenopsis Tasmanica*, Nyl. Flor. Tas., 200.
8. *Lempholemma miriococcum*, Ach. Leighton, p. 16.
9. *Synalissa cancellata*, Wilson. Proc. Roy. Soc., 1892, p. 151.
10. *Sphinctrina turbinata*, Pers., E.B. 2520. Engler, p. 91, fig. 42.
11. *Coniocybe furfuracea*, Ach. Engler, p. 81, fig. 42.
12. *Chænotheca chrysocephala* (Turn.) Engler, p. 81, fig. 42.
13. *Calicium hyperella* (Ach.), Pers. Engler, p. 81, fig. 42, A.
14. *Pyrgillus javanicus*, Nyl. Section of apothecium, Engler, p. 84, fig. 43, B.
15. *Acolium viridi-locularis*, Wilson. Proc. Roy. Soc., 1892, p. 170.
16. *Sphærophoron coralloides*, Pers. Lindsay, p. 258, pl. 16.
17. *Gomphillus bœmycioides*, Wilson. Proc. Roy. Soc., 1892, p. 173.
18. *Bœomyces placophyllus*, Wubg. Engler, p. 141, fig. 65, B.
19. *Thysanothecium Hookeri*, Berk. et Mont. Engler, p. 141, fig. 65, B.
20. *Clathrina retipora*, Labill. Engler, p. 144, fig. 67, B.
21. *Cladonia pyxidata* (L.), E. Fries. Engler, p. 144, fig. 67, E.
22. *Stereocaulon paschale*, Ach. Lindsay, pl. 17.
23. *Siphula.* Fructification unknown. Wils. collection.
24. *Thamnolia vermicularis*, Ach. Engler, p. 225, fig. 118.
25. *Usnea florida*, Hoffm. Engler, p. 224, fig. 117, E.

PLATE IX.

R. A. BASTOW, *del.*

TYPICAL VICTORIAN LICHENS.

(Variously reduced.)

26. *Evernia vulpina*, Lin. Wils. collection.
27. *Ramalina eckloni*, Spreng. Wils. collection.
28. *Theloschistes chrysopthalmus* (L.), Th. Fr. Engler, p. 229, fig. 120, B.
29. *Anaptychia ciliaris*, Ach. Engler, p. 235, fig. 123, C.
30. *Gyrophora cylindrica*, Ach. Engler, p. 148, fig. 69, A. and C.
31. *Heterodia Müllerí* (Hpe.), Nyl. Engler, p. 208, fig. 108, A. and B.
32. *Nephromium cellulosum*, Ach. Own collection.
33. *Nephroma resupinatum* (L.) Engler, p. 191, fig. 106, D.
34. *Peltigera venosa* (L.), Hoffm. Engler, p. 191, fig. 101, A.
35. *Endocarpiseum guipini*, Nyl. Own collection.
36. *Stictina carpoloma*, Delix. F. N.Z., cxxvi.
37. *Sticta dichotomoides*, Nyl. Engler, p. 186, D.
38. *Parmelia conspersa* (Ehrh.), Ach. Engler, p. 211, fig. 109, B.
39. *Anzia colpodes* (Michx.), Stizbg. Engler, p. 214, fig. 111, A.
40. *Zanthoria parietina* (L.) Lindsay, pl. 12, fig. 16—spores, sterigmata, and spermatia.
41. *Physcia cæsia* (Hoffm.) Own collection.
42. *Pyxine coccœa* (Sw.), Nyl. National Herbarium, Melb.
43. *Psoroma sphinctrinum* (Mont.), Nyl. Engler, p. 179, fig. 95, C., spores.
44. *Pannaria leucosticta*, Tuck. Engler, p. 179, fig. 95, A. B.
45. *Parmeliella nigrocincta*. National Herbarium, Melb.
46. *Coccocarpia aurantica*, Hook. et Tayl. Engler, p. 179, fig. 95, D.
47. *Phyllopsora melanocarpa*, Mull., Arg. Own collection.
48. *Psora decipiens* (Ehrh.), Ach. Engler, p. 132. Own collection.
49. *Thalloidina impolipsii*, Wilson. A fragment only.
50. *Placodium gelidum* (L.) Own collection.
51. *Caloplaca murorum*, Hoffm. (*Amphiloma murorum*, Hoffm.)
52. *Candalariella vitellinum* (Ehrh.), Mull., Arg. Engler, p. 206, fig. 107, D.
53. *Lecanora subfusca* (L.), Ach. Engler, p. 206, A.
54. *Lecania subsquamalosa*, Wilson.
55. *Calopisma aurantiaca* (Lightft.) Own collection.
56. *Rinodina cæsiella*, Kerb. Engler, p. 231, fig. 121, C.
57. *Diploschistes scruposus* (L.), Born. Engler, p. 122, fig. 60, A. and F.
58. *Pertusaria verrucosa*, Mont. Engler, p. 196, fig. 103, A.
59. *Phlyctella Wilsoni*. Own collection.
60. *Mycoblastus sanguinaria* (L.), Th. Fr. Lindsay, p. 14, fig. 15.
61. *Lecidea confluens* (Web.), Kbr. Engler, p. 130, fig. 63, A.
62. *Sphærophoropsis stereocauloides*, Ach. Engler, p. 133, fig. 64, B.
63. *Pattellaria bryophylla*, Ehrh. Own collection.
64. *Blastenia pulcherrima* (Mass.) Own collection.
65. *Heterothecium vulpinus*, Tuck (Lopadium, syn.)
66. *Buellia stellulata*, Tayl. Own collection.
67. *Diplotomma alboatra* (Hoffm.) Leighton, p. 346. (Syn. Buellia.)
68. *Rhizocarpon geographica* (L.) E. B., 245.
69. *Biatoriopsis planella*, Nyl. National Herbarium, Melb.
70. *Byssocaulon* (Mont.), Nyl. National Herbarium, Melb.
71. *Cænogonium Finkii*, Ehrbg. Engler, p. 128, fig. 62, C., D.
72. *Occellularia bonplonde* (Sprgl.) Own collection.
73. *Thelotrema lepadinum*, Ach. Engler, p. 119, fig. 58, A., B.
74. *Phœotrema expansum* (*Wainio*). Own collection.
75. *Leptotrema Wightii* (Matt.) Engler, p. 119, fig. 58.
76. *Dirinastrum Australiense*, Mull., Arg., (see *Dirina*). Engler, p. 106, fig. 51, A.
77. *Platygrapha abietina* (Ach.), Kerb. Engler, p. 115, fig. 55, A. et B.
78. *Opegrapha varia*, Pers. Engler, p. 95, fig. 47, A., B., D.
79. *Melanographa asteriscus*, J. M. (Sub-genus of Melaspilea.)
80. *Melaspilea gemella*, Nyl. National Herbarium, Melb.
81. *Graphis scripta* (L.), Ach. National Herbarium, Melb.
82. *Phæographis cinerascens*, Mull., Arg. Own collection.

83. *Phæographina*, Mull., Arg. Own collection.
84. *Arthonia radiata* (Pers.) Engler, p. 89, fig. 45, A., B., C., D.
85. *Arthothelium fusco-rufus* (Mull. ?) Own collection.
86. *Arthothelium spectabile* (Hepp.), spores.
87. *Celidium stictarum* (Tulz.), Kerb. Parasite on sticta.
88. *Abrothallus microspermum* (De Notre). Parasite on Sticta and Parmelia. National Herbarium, Melb.
89. *Chiadecton myrticola* (Fee). Engler, p. 104, fig. 50, A., C., D.
90. *Glyphis confluens* (Ach.), Fee. Own collection.
91. *Sarcographa labyrinthica* (Ach.), Mull., Arg. Own collection.
92. *Mycoporum elabens*, Flot. Engler, p. 78, fig. 46.
93. *Mycoporellum microspermum*, Mull., Arg. Own collection.
94. *Asteroporum rivale*, Mull., Arg. Own collection.
95. *Myriangium inconspicuum*, Bab. F. N.Z., 128.
96. *Endopyrenium hepaticus*. Own collection.
97. *Normandina pulchella*, Nyl. Own collection.
98. *Endocarpon miniatum* (L.) Engler, p. 60, fig. 33; Lindsay, pl. 20.
99. *Strigula elegans* (Fee.), Mull., Arg. Engler, p. 75, fig. 39.
100. *Verrucaria Hocstetteri*, Fr. Engler, p. 54, fig. 51.
101. *Arthropyrenia niven*, Wils. Own collection.
102. *Porina Wilsoniana* (Müller). Own collection.
103. *Polyblastia sepulta*, Mass. Engler, p. 54, fig. 31.
104. *Limboria sphinctrina*, Nyl. Own collection.
105. *Pyrenula nitida* (Ach.) Engler, p. 63, fig. 35, A., B., H.
106. *Irvpethelium eltueriæ*, Spreng. Engler, p. 69, fig. 36.
107. *Melanotheca cruentum*, Mull., Arg. National Herbarium, Melb.
108. *Parmentaria gregale* (?)
109. Pyenides. Lindsay, p. 2.
110. Sterigmata and Spermatia.
111. Spermogenes, section.
112. Apothecium, section.

APPENDIX.

OTHER CLASSIFICATION.

Not being intimate with the German language, I had recourse to the "Encyclopædia Britannica," wherein I perceived that Engler and Prantl's classification of lichens was in close relation to the Schwendenerian theory, and is therein outlined as follows. It may be useful for the student to have it by him.

PYRENOLICHENES.

Series 1.—Perithecium simple, not divided.
- (*a*) With Pleurococcus or Palmella gonidia—
  Mariolaceæ, Verrucariaceæ, Pyrenothamnaceæ.
- (*b*) With Chroolepus gonidia—
  Pyrenolaceæ, Paratheliaceæ.
- (*c*) With Phyllactidium or Cephaleurus gonidia—
  Strigulaceæ.
- (*d*) With Nostoc or Scytonema gonidia—
  Pyrenidiaceæ.

Series 2. — Perethecia divided or imperfectly divided by cross walls. Mycoporaceæ with Palmella or Chroolepus gonidia.

DISCOLICHENES.

Series 1.—Coniocarpineæ. The paraphyses form a network (capittilium) over the asci, the capittilium and ejected spores forming a long, persistent, powdery mass (mazædium)—
Caliciaceæ, Cypheliaceæ, Sphærephoraceæ.

Series 2.—Graphidineæ. Apothecia seldom round, usually elongated-ellipsoidal, no capittilium—
Arthoniaceæ, Graphidiaceæ, Rocellaceæ.

Series 3.—Cyclocarpinea. Apothecium usually circular, no capittilium.
(*a*) Spores usually two-celled, either with a strongly thickened cross-wall often perforated by a narrow canal or with cross-wall only slightly thickened. In the first case the spores are usually colourless, the second case always brown—
Buelliaceæ, Physiaceæ.
(*b*) Spores unicellular, parallel-multicellular, or muriform, usually colourless, cross-walls usually thin.
(*a*) Thallus in moist state more or less gelatinous.
Gonidia always belonging to the Cyanophyceæ, Lichinaceæ, Ephebaceæ, Collemaceæ, Pyrenopsidaceæ.
(*b*) Thallus not gelatinous.
Cœnogoniaceæ, Lecideaceæ, Cladoniaceæ, Lecanoraceæ, Pertusariaceæ, Peltigeraceæ, Stictaceæ, Pannariaceæ, Gyrophoraceæ, Parmeliaceæ, Cladoniaceæ, Usnaceæ.

BASIDIOLICHENES (Hymen-Lichens).

Cora, Dictyonema, including Laudatea, Corella (doubtfully placed here, as the hymenium is unknown).

Such is the Engler system, and it is favoured by many eminent botanists. This will intimate to the lichenologist the way in which modern thought is tending, and I would strongly recommend to every student a careful perusal of Engler and Prantl's valuable work.

NOTES ON THE COLEOPTERA OF NORTH-WESTERN VICTORIA.

PART V.

BY J. C. GOUDIE.

(*Read before the Field Naturalists' Club of Victoria, 13th Oct.*, 1913.)

THE last paper on this subject * concluded with an account of the Scydmænidæ. We have now to pass over three families—viz., Silphidæ, Trichopterygidæ, and Scaphidiidæ—as being unrepresented (or at least unrecorded) in the insect fauna of the Mallee. It is difficult to account for the absence of some of these "missing links" from the entomological chain. For example, the species of an interesting blind genus, Rodwayia, of the Trichopterygidæ, are found abundantly both in Tasmania and New South Wales. They occur as inquilines in the nests of several species of ants, at least one of which, *Ectatomma metallicum*, is evenly distributed over the Eyrean sub-region, of which this district forms a part.

HESTERIDÆ.

This is a moderate-sized family, comprised in two groups—the Hololeptides, typical species of which are broad and flat, living under the bark of trees, &c., and the Histerides, recog-

* *Vict. Nat.*, xxix. (September, 1912), p. 72.

nized by their broad, strongly convex form, truncate elytra, clubbed antennæ, and dentate tibiæ. The local species are all contained in the latter sub-family, and, with the exception of the genus Chlamydopsis, are energetic destroyers of decaying animal refuse of any kind. They may be seen at times flying on hot days or crawling on paths; but generally you have to search for them as indicated above.

SUB-FAMILY HISTERIDES.

Carcinops 14-*striata*, Steph.

This is said to be an introduced species. It is a small shining black beetle, about 2 mm. in length, with seven distinct striæ on each elytron.

Chlamydopsis carbo, Lea, Proc. Roy. Soc. Vic., xxiii. (new series), part 1, p. 204, fig. 20.
C. epipleuralis, Lea, *loc. cit.*, xxv., p. 68.

1914. *C. formicicola*, King. Originally placed by King in the family Byrrhidæ, under the generic name Byzenia.

The little beetles belonging to this genus are very singular in appearance. They are squarely built, with retractile legs and antennæ. In several species the "shoulders" of the elytra are raised and thickened so as to form a sort of epaulette, from which projects a thin membrane. Another feature common to many species is a deep fovea-like depression in the elytra behind the shoulders. They frequent the nests of various species of ants, and when lying motionless, with the legs and antennæ tucked away, might easily be passed over on account of their resemblance to the broken remains of other insects that have formed a part of the *menu* of the ants.

They are all extremely rare, most of the descriptions having been drawn up from single specimens. *C. carbo* is a black species, having a curious bifid, horn-like projection springing obliquely from the apex of prothorax and overhanging the head. It was described from a unique specimen found near Sea Lake in a nest of minute black ants (Pheidole, sp.) Length, $2\frac{3}{4}$ mm.

C. epipleuralis and *C. formicicola* resemble each other considerably. They are chestnut-brown in colour and about $2\frac{3}{4}$ mm. in length.

Saprinus australasiæ, Blackb.

1703. *S. cyaneus*, Fabr.
1706. *S. lætus*, Er.

These are typical Histerides, so much alike in form and colour as to render their separation very difficult. They are brilliantly coloured, the elytra being of a vivid metallic blue

or green, while the prothorax is like burnished copper. I submitted a series for examination to Mr. Lea, who wrote in reply :—" I have always found the identification of Saprini difficult and unsatisfactory, and believe that confusion is almost general. Size and shades of colour seem to go for nothing in the genus. *S. cyaneus* may be distinguished from *australasiæ* as follows :—(1) *S. cyaneus*, Fab., as identified by Lewis (the world's authority on Histeridæ), has a short curved line of punctures, sometimes looking like a feeble stria, at the base of elytra, near suture, punctures leaving a polished space to beyond first stria. (2) *S. australasiæ*, Blackb.—Without the little curved line of punctures of *cyaneus*, and with elytral punctures advanced beyond base of first stria."

1708. *S.* (*Gnathoncus*) *rupicola*, Mars.

A small black species with numerous punctures on the prothorax, which renders it one of the few distinct species.

Hypocaccus sinæ, Mars.

Specimens in my collection differ slightly from the type in having the apparently impunctate space on the prothorax with minute punctures, whereas on the type there are none.

PHALACRIDÆ.

7892. *Phalacrinus australis*, Blackb.
7896. *P. rotundus*, Blackb.

These are small, oval, convex beetles, of a brownish tint. They are found under dry leaves, sometimes in considerable numbers.

AN ADDITION TO THE VICTORIAN FRESH-WATER COPEPODA. (With Plate.)

By J. SEARLE.

(*Read before the Field Naturalists' Club of Victoria, 8th Dec.*, 1913.)

THE species of Boeckella here described was first taken at Alphington on 16th October, 1912, at an excursion of the Field Naturalists' Club. Since then it has been found in several places around Melbourne, and has been recorded in reports of Club excursions and elsewhere under the name of *Boeckella asymmetrica*, though not previously described as such. On our last pond-life excursion to Alphington, on 18th October, it was present in great numbers in the ponds on either side of the Yarra, near the Outer Circle railway bridge.

The species resembling it most are *B. minuta* and *B. tenera*, G. O. Sars., but it differs from each of these in size, in the shape of the inner lobes of the lateral expansions on the last thoracic segment, and of the genital segment of the female, and in the

shape of the fifth thoracic legs of the male. It is the smallest species but one of Boeckella, exceeding *B. minuta* in length by .15 mm. only.

In quite a number of specimens of this new species taken recently the females were attacked with a parasitic growth attached to the abdomen, forming a globular mass resembling an enormous egg-sac. This in no way impeded their movements, nor did it seem to affect their vitality. Specimens so afflicted, as well as normal individuals, are exhibited under the microscope this evening.

BOECKELLA ASYMMETRICA, J. Searle, n. sp.

Specific Characters.—Body of female oblong-ovate in form, broadest at the first thoracic segment and tapering anteriorly. Head as long as the three succeeding segments; fifth thoracic segment bearing narrow lateral projections, slightly divergent and extending as far as the end of the genital segment. Subdorsal projections asymmetrical, that on the left side triangular with the point slightly hooked inwards, while that on the right is much smaller and simply rounded off. Genital segment of abdomen asymmetrical, nearly straight on the left side, bulging at the upper part on the right and protuberant on the ventral side. Caudal furca almost as long as the abdomen. First antenna 25 joints, when reflexed reaching beyond the caudal furca; second antenna, maxilla, maxillipedes resembling those of most Boeckella. Fifth pair of legs in female of typical shape. Egg-sac with 8 to 12 eggs.

The male is much smaller than the female. First antenna geniculated on the right side, and bearing many *asthetasks*; fifth thoracic segment ending in small triangular projections. The fifth pair of legs in male most resemble those of *B. minuta*. The left leg has the triangular lamella on the inside of the second basal joint, but it is broader and longer than in *B. minuta*, and the inner ramus is altogether wanting. The right leg is very similar to that of *B. minuta*, the spine on the second joint being twice as long as that on the first, and the greatly curved apical claw being longer than the ramus itself; the inner ramus sub-cylindrical, and differing very slightly from *B. minuta*.

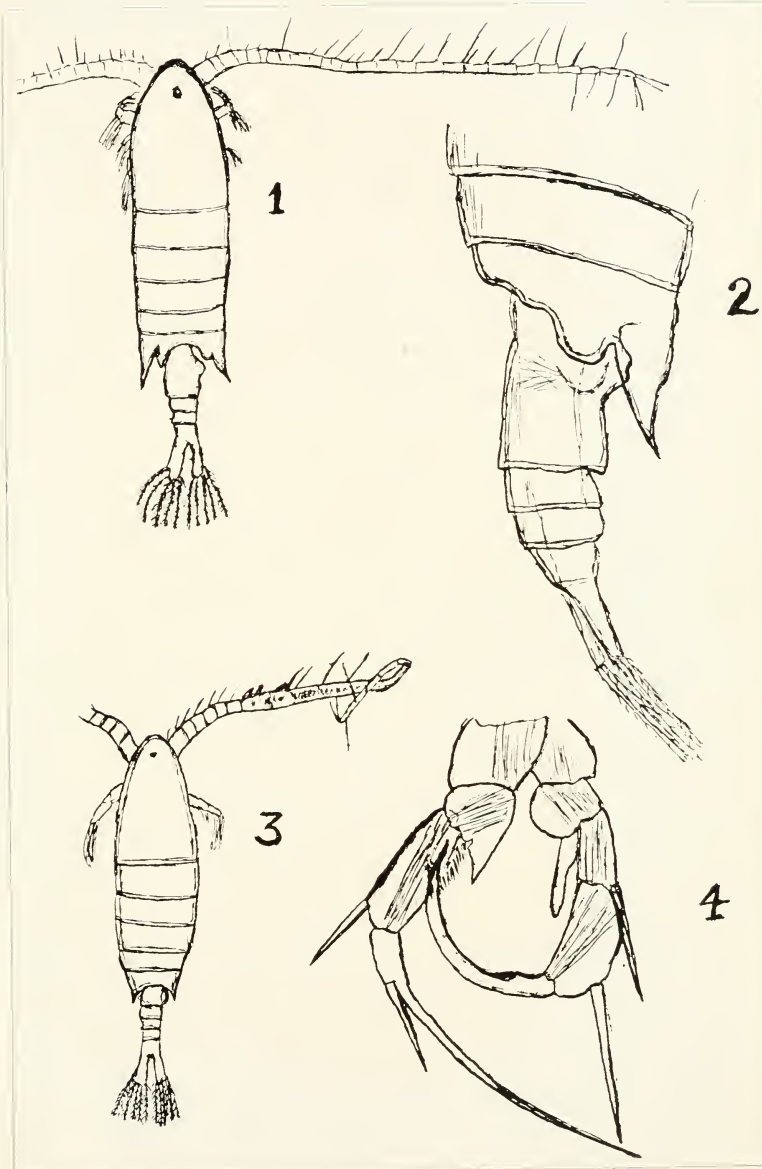
Length of male, .75 mm.; of female, 1.45 mm.

Occurrence.—In most of the pools in the Yarra valley, near Melbourne.

EXPLANATION OF PLATE.

Fig. 1.—*Boeckella asymmetrica*, female, x 60 (about).
Fig. 2.—Fourth and fifth thoracic segments and abdomen of female from right side.
Fig. 3.—*B. asymmetrica*, male, x 60 (about).
Fig. 4.—Fifth thoracic feet of male.

PLATE X.



BOECKELLA ASYMMETRICA, J. SEARLE, N. SP.

The Victorian Naturalist.

Vol. XXX.—No. 11. MARCH 5, 1914. No. 363.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 9th February, 1914. Dr. C. S. Sutton, one of the vice-presidents, occupied the chair, and about 40 members and visitors were present.

REPORTS.

A report of the excursion to Mount Baw Baw, Saturday to Tuesday, 24th to 27th January, was given by the acting leader, Mr. F. G. A. Barnard, who said that, despite the short time available for collecting on the plateau, excellent work had been done, especially in botany and micro-fungi, while all the members of the party enjoyed the outing thoroughly, notwithstanding the somewhat strenuous nature of the exercise involved. The report was kindly illustrated by Mr. J. Searle with a series of lantern views.

The chairman said the thanks of the Club were due to Mr. Barnard for his interesting report. He referred to a trip to the Baw Baw plateau made by two other members and himself some years ago, and suggested that arrangements should be made for a Club party to spend at least a week there.

Mr. St. John said that the discovery of *Eucalyptus nitens*, and the presence of *Eucalyptus Delegatensis* on Mt. Erica, had to be added to the report.

Mr. F. Pitcher asked if the party had come across the Native Beech, *Fagus Cunninghami*, in exposed situations on the plateau.

In reply Mr. Barnard said a few small bushes had been noticed in exposed places, and larger specimens in the heads of the streams rising on the plateau.

GENERAL BUSINESS.

Mr. A. D. Hardy, F.L.S., referred to the publication, in the October part of the *Proceedings of the Linnean Society of London*, of the annual address of the president, Professor E. B. Poulton, F.R.S., who took for his subject a remarkable pamphlet, published in 1849, in which the author, G. W. Steeper, had in part anticipated the conclusions of Darwin as regards the theory of variation and the survival of the fittest, and also the present germ theory of disease. The pamphlet had been subjected to searching criticism as to its authenticity, &c., and so far as can be ascertained may up to the present be considered genuine.

In view of the very great interest aroused by the address, he ventured to bring the matter before the Club.

PAPER READ.

By Mr. T. S. Hart, M.A., B.C.E., F.G.S., entitled "Some Coastal Plants: their Shelter and Fire Danger."

The author said that the prevalent coastal tea-tree scrub is well known to be highly imflammable, but to eradicate it from the sea-shore would lead only to the sand drifting and becoming a serious nuisance. There were, however, certain native plants of a fire-resisting character which could be substituted for the tea-tree. Of these the Boobialla, *Myoporum insulare*, and the Coast Acacia, *Acacia longifolia*, var. *sophoræ*, were the most useful; to these might be added the introduced shrub *Coprosma lucida*. At one place at Chelsea, where the Coast Acacia was growing, he noticed the fire had been considerably lessened, and he had come to the conclusion that the danger of fire in such areas could be greatly decreased by encouraging the natural growth of such plants. He suggested that they should be planted in strips among the tea-tree of sufficient width to check a fire. Thus a diversified scrub much more pleasing to the eye than pure tea-tree would be produced, and the requirements of shelter and sand binding be at the same time secured. Boobialla would take first place, as it is was easily grown, and would carry foliage to the ground. There was no reason why paths through the scrub, or fire-breaks, should not be bordered with these fire-resisting trees.

The chairman said that Mr. Hart should be congratulated on his most interesting and useful paper.

Mr. F. G. A. Barnard said the Club was indebted to the author for bringing such a useful and interesting subject before them. He suggested that copies of the paper, when printed, should be forwarded to the various Progress Associations and other interested bodies.

Messrs. A. D. Hardy, F.L.S., and F. Pitcher also spoke, and agreed as to the great value of the experiments conducted by the author.

NATURAL HISTORY NOTES.

Mr. A. D. Hardy, F.L.S., asked whether Bell-birds, *Manorhina melanophrys*, were shy. He had heard from many folk that they were; but a week ago, when north of Pakenham, he found the scrub full of them and they were so tame as to be approachable within a few yards.

Mr. P. R. H. St. John said that his experience in Gippsland was that Bell-birds were very fearless and would approach quite close to strangers.

Mr. J. Searle asked if the Ceratium, one of the Peridineæ, had been recorded for Victoria.

Mr. A. D. Hardy, F.L.S., replied that he had noticed it in the water of the Yan Yean Reservoir.

EXHIBITS.

By Mr. E. S. Anthony.—Specimens of stone implements from Barclay Table-land, Northern Territory, comprising axe-head, flaked knives (with bark sheaths), chipped knives (used by lubras), spear-heads (one with portion of reed to show method of hafting), churingas, adze (for grooving boomerangs, pitchis, &c.), also drawings on limestone rocks by natives.

By Mr. E. O. Armytage.—Coleoptera and Lepidoptera from Baw Baw excursion, including the butterflies *Papilio macleayanus*, Leach, *Xenica correæ*, Oll., *X. kershawii*, Miskin, and *Heteronympha solandri*, Waterhouse; also the beetles *Stigmodera dimidata*, Carter, and *Trypocharia namata*, Newm., from Moe.

By Mr. F. G. A. Barnard.—Growing plant in bloom of *Aster celmisia*, from Mt. Erica, Baw Baw, and other botanical specimens, including *Epacris breviflora* and *Richea Gunnii*.

By Mr. R. A. Bastow.—Lichens from Camperdown—*Ramalina Eckloni*, Spreng., *Parmelia parietina*, L., *Theloschistes chrysophthalmus*, L., and *Physcia dilatata*.

By Mr. C. French, jun.—Orchids *Prasophyllum brevilabre* and *P. Suttoni* (rare)—the latter recently described from Mt. Kosciusko; also *Thelymitra venosa* (new for Victoria), collected by exhibitor, Mt. Baw Baw plateau, January, 1914; also a photograph of a remarkable scale-insect, *Pulvinaria tecta*, var. *alba*, also collected by the exhibitor, near Walhalla.

By Mr. C. J. Gabriel.—Marine shells, *Tapes litterata*, L., N.-W. Australia; *T. euglyptus*, Phil., Japan; *T. graeffei*, Dunk., Japan; *T. papilionacea*, Sow., Ceylon.

By Mr. A. D. Hardy, F.L.S.—*Spirotænia condensata*, a fresh-water alga, from Mt. Baw Baw, from Sphagnum collected by Mr. F. G. A. Barnard, January, 1914.

By Mr. E. E. Pescott, F.L.S.—Growing plant in flower of *Cephalotus follicularis*, Lab. (Saxifragaceæ), the Pitcher-plant of King George's Sound, Western Australia.

By Mr. F. Pitcher.—Blooms from plants now flowering in the Melbourne Botanical Gardens—*Castanospermum australe*, A. Cunn., Moreton Bay Chestnut or Bean-tree, New South Wales and Queensland; *Ceratopetalum gummiferum*, Sm., the New South Wales Christmas-bush, New South Wales; and *Humea elegans*, Sm., Plumed Humea, Victoria and New South Wales.

By Mr. J. Searle.—Ceratium, sp. (Peridineæ), in fresh water from Trawool; also crustaceans, *Phreatoicus australis*, *Talitrus sylvaticus*, and *Oniscus punctatum*, from Baw Baw excursion.

By Dr. C. S. Sutton.—Photographs of the Cradle Mountain, Tasmania, its surroundings, and certain plants occurring in the locality.

After the usual conversazione the meeting terminated.

Correction.—In last month's Proceedings, page 172, lines 5, 6, for "classed among the Breams," read "considered as allied to the Blennies."

THE LATE CHARLES M. MAPLESTONE.

Natural science in Victoria has sustained a severe loss by the death of Mr. Charles M. Maplestone, which occurred at Eltham on the 18th January. Mr. Maplestone, who at the time of his death was 75 years of age, for the greater part of his life was an officer in the Victorian Postal Department, and, while occupying the position of postmaster, was stationed at various seaside localities, where he devoted much of his leisure time to the study of marine natural history. So far back as 1872 he forwarded to the Royal Microscopical Society, London, a paper describing the odontophores of the marine mollusca of our shores, accompanied by accurate and delicately executed figures, which, he explained, were his first attempts at natural history drawings with the pen. This paper, with the drawings, was published in the *Monthly Microscopical Journal.*

About 1880 Mr. Maplestone began to concentrate his attention on the Bryozoa, of which he had been a student since 1866, and in 1881 he contributed to the *Proceedings of the Royal Society of Victoria* a paper entitled "Observations on Living Polyzoa," in which he described the animals of a number of species, only known otherwise from the empty polyzoaries. About the same time he described several new species in papers read before the Microscopical Society of Victoria. Owing to the amalgamation of that society with the Royal Society, and the consequent discontinuance of its journal, some of these papers were not published, and one of his new genera—Dikista—lapsed, and was afterwards described by the late Dr. P. H. Macgillivray under the genus name Maplestonia. Many of Mr. Maplestone's notes were communicated to Dr. Macgillivray, and utilized by that gentleman, and by Professor M'Coy in his "Prodromus." After 1884 Mr. Maplestone's official duties as an inspector necessitated constant travelling, and prevented his working at his favourite study, and all his undescribed material was handed over to Dr. Macgillivray.

In 1898 Mr. Maplestone, whose retirement from official life had then afforded him leisure to resume his scientific pursuits, undertook, at the suggestion of Professor Spencer, to furnish

a series of descriptions of the Tertiary Polyzoa of Victoria, supplementary to the important monograph of that group contributed to the *Transactions of the Royal Society of Victoria* by Dr. Macgillivray, whose death had occurred before the appearance of his completed work. In May, 1898, Mr. Maplestone presented the first part of his "Further Descriptions of the Tertiary Polyzoa of Victoria," of which the twelfth and last part was read on the 12th of December, 1912. Interspersed with this series were several papers on recent species, the last of which was presented at the same meeting as the last paper dealing with the fossil forms. These two short papers are a striking illustration of Mr. Maplestone's courage and perseverance under great disabilities, as at the time of preparing them he was much broken in health, had long lost the sight of one eye, and had the other so weakened that he was forbidden the use of the microscope for more than half an hour a day. These papers concluded the series of over twenty communications to the Royal Society, all referring to the Bryozoa, on which group Mr. Maplestone had been recognized, since the death of Dr. Macgillivray, as the leading Australian authority. He also contributed to the *Records of the Australian Museum* in 1909–10 a couple of short papers on the Bryozoa collected by the *Miner* in the Tasman Sea. There are few indeed among the marine invertebrata of our shores which are now better known than the Bryozoa, thanks to the long series of patient investigations carried out by Dr. Macgillivray and later by Mr. Maplestone.

He became a member of the Field Naturalists' Club in November, 1894, and, though living so far away as Eltham, was a frequent visitor at the monthly meetings. During his official trips about the State he had made many observations relating to the flowering times of orchids, and in October, 1895, contributed an article on the subject to the *Naturalist* (vol. xii., p. 82); and at the December meeting read a useful and interesting paper entitled "Calendars, and Indexing Natural History Observations," which was published in the *Naturalist* for January, 1896 (vol. xii., p. 120). He was most methodical in his manner of dealing with his observations, and it is to be hoped his notes will pass into appreciative hands. Mr. Maplestone was laid to rest among others of his kindred in the little cemetery attached to Rose Chapel, St. Helena, near Eltham.—W. M. B.

Vernacular Names of Victorian Plants.—A further portion of this list appears in the *Journal of Agriculture of Victoria* for February, comprising the orders from Chenopodiaceæ to Callitrichaceæ.

EXCURSION TO BAW BAW.

In 1910 the Baw Baw plateau was made more accessible to visitors by the opening of the narrow-gauge railway to Walhalla, and, though we had heard from Dr. Sutton in May, 1905 (*Vict. Nat.*, xxii., p. 58), of the great interest of its flora, it was not until the current year that, on my suggestion, it was put on the excursion list for Foundation Day (26th January). Our president, Mr. J. A. Kershaw, having often expressed the desire to visit the district, was put down as leader. However, when the time came round to make preparations for the trip, Mr. Kershaw was on a collecting trip in North Queensland, so, as I had the previous Easter gone over a little of the ground, and decided that Harris would make a good starting-point for the excursion, I took upon myself the duties of acting-leader.

At the January meeting of the Club seven other names were handed in—viz., Messrs. E. Armytage (a new member then elected), C. French, jun., J. G. O'Donoghue, O. W. Rosenhain, J. Searle, H. Whitmore, and a non-member, Mr. T. E. Turner—a good representative party of the different tastes of the Club members. We duly met at the appointed time on Saturday morning, 24th January, and took our seats in the compartment which had been reserved for us in the Sale train. Nothing of particular interest happened on the first stage of our journey. As we approached Moe the entomologists were gladdened by the sight of numerous Bursaria bushes in full bloom, which augured well for a supply of beetles.

At Moe (80 miles) it was necessary to change trains, which was not to our advantage, as the accommodation on the Walhalla line is decidedly limited, only one carriage being usually provided. The day had become fairly warm, but the novelty of the scene as we climbed the hillsides was some compensation. For a few miles out of Moe the line is comparatively level. The Latrobe River is first crossed, and within sight of the train is the termination of the Moe Swamp drain, which joins the Latrobe not far from the railway bridge, while on the other side of the line the Narracan Creek, draining part of the southern slopes of the Strzelecki Ranges, also enters the Latrobe. Some flat, swampy land overgrown with the tea-trees *Melaleuca ericifolia* and *M. squarrosa*, with *Kunzea peduncularis*, is next met with, and through this the Tanjil meanders before it also joins the Latrobe. Passing Gooding, the first station, poor undulating country is passed through, the line winding round the hills and gradually rising. Near Gould, the Tyers, a pretty, tree-bordered stream, is crossed. Rising rapidly, with numerous curves, the line now enters the Moondarra country, distinguishable by its red volcanic soil of

great depth, until at 15 miles, when it has risen nearly 1,000 feet, the train pulls up at a little wayside station, Moondarra, where an enterprising resident has established a refreshment room. Here we got a nearer view of our objective—a huge mountain mass standing boldly up to the north, without any prominent peaks. The outlook was hazy on account of the smoke of bush-fires, but there is a very fine view westward from Moondarra over the valleys of the Tyers and Tanjil Rivers. The next station, Watson, is still higher, in more primitive country. A couple of miles further we reached Harris (formerly Upper Moondarra), the Moondarra of the tourist map, 1,320 feet above sea-level, the highest station on the line, and 18¼ miles from Moe. Here we were met by our guide, Mr. C. Rawson, who was a little taken aback by the amount of impedimenta the naturalists considered necessary for such a trip, and, as we still had to buy tinned stores, another pack-horse had to be requisitioned. However, hand-bags, bundles, &c., soon disappeared into the pack-bags, and by 3 p.m. we had started on our twelve-mile walk. Some of the members think that the surveyors must have made some mistake when measuring the mileage, for they are confident the distance is nearer twenty-five than twelve; but it must be borne in mind that there is a rise of three-fifths of a mile in the distance. However, we must take the surveyors' word for it. The afternoon was rather hot, but we made good progress, and soon reached "Parker's Corner" (1,600 feet), 8 miles 50 chains from the shelter-house on Mount Erica, where we intended to spend the night. Here the Baw Baw track may be said to commence; the surrounding country was very similar to that about Evelyn or Ringwood. The beautiful blue flowers of *Lobelia simplicicaulis* and the creamy-white spikes of *Lomatia ilicifolia* were fairly plentiful hereabouts. We had not gone far before an Echidna, or Porcupine Ant-eater, was captured, but after a short inspection was allowed its liberty. Hotel Creek, a small tributary of the Tyers, was next crossed —near this *Helichrysum rosmarinifolium* was first met with— and at the 43-mile tree (the mileage is measured from M'Veigh's, 20 miles above Warburton) we had ascended to 1,740 feet. The track was bordered on either side by bracken, the Rainbow Fern, *Davallia dubia*, *Helichrysum ferrugineum*, *Pultenæa Muelleri*, Epacris, &c., while in the hollows tree-ferns could be seen. Near by one of our keen-eyed collectors got specimens of the rare orchid, *Cryptostylis leptochila*, also the orchids *Dipodium punctatum*, *Chiloglottis Gunnii*, and *Calochilus Robertsoni*. Several termites' mounds were passed. The makers of these mounds are usually called "white ants," but they are not ants, and do not belong even to the same order

of insects. A particularly high one was photographed on our return. The track rose and fell, and about a mile further had descended to 1,460 feet, where it was only about forty feet above the eastern branch of the Tyers, a clear running stream near which we rested for a while to boil the billy and have a snack, as most of us had not tasted anything since the early morning at Warragul. Here our attention was attracted by some stones in the water, on which the larvæ of some insect had constructed, of a few grains of coarse sand, a shelter in which to pupate. Some of these were secured on our return, and may form the subject of a future note.

Time was getting on, and half an hour was all our guide could allow us if we intended to reach the shelter-house that night. Soon after leaving this spot the track rises in earnest, and about a mile further we reached the commencement of the steep climb up Erica. Our road here was bordered with magnificent tree-ferns, which, in the waning light, looked most enchanting. Tall gums shot up on either side, 200 to 250 feet, perfectly straight, and the excuse was often made, when short of wind, to stand and admire their column-like trunks. Unfortunately for us, full moon had happened a fortnight before, and in the tall timber daylight disappeared more rapidly than it would have done in more open country, so that we were now tripping over stones or roots, or slipping on the dry bark, which seemed to have fallen parallel with the track, so causing us more trouble. The grade here must have been about 1 in 1. Presently our guide said we had no hope of reaching the shelter-house, and that we had better camp at the spot known as "The Rocks" (see tourist map) for the night. He had hardly said this (about 9 p.m.) than one of the party, slipping, fell heavily on a projecting stone, and at first it was feared had fractured a rib or two, but it fortunately turned out to be only a severe shaking. As we were then close to the spot marked "water" on the map (38 m. 78 ch.), and locally known as "The Myrtles," as the first beeches or "myrtles" are met with there, the guide advised us to camp for the night. Accordingly a fire was started, and by its light we proceeded to find our rugs, and secure comfortable spots on which to rest our weary limbs. There happened to be here an opening in the timber, about a chain in diameter, which afforded ample room. Some of us were not sorry it had been decided to stop, and the mosquitoes of the neighbourhood were evidently of the same opinion, for they paid us so many friendly (or unfriendly) visits throughout the night that sleep was almost impossible. However, it was a beautiful starlight night, and as we lay on our backs we could watch the constellations as they passed overhead. Though the wind was

sighing in the tree-tops 150 to 200 feet above us, there was very little movement at the ground level. An occasional groan from some bundle of rugs would indicate that the would-be sleeper was finding his mattress rather springless. About four o'clock signs of the coming day in the shape of a pink glow was showing through the trees, and very soon all were astir, having a wash at the stream close by, or making preparations for breakfast. When daylight came we found that, had we gone a few yards further, the ground would have been more level, and the effort of trying to sleep with our heads about two feet higher than our feet might have been avoided. However, no one seemed the worse for the camp in the open. By half-past six breakfast was over, and everything packed ready for the march. In a few hundred yards we were out of the tall timber and had left the bulk of the ferns behind, and found ourselves in the vicinity of "The Rocks," a somewhat desolate region, on account of the vegetation having been burned out by fires. There are some very grand and massive rock scenes here, but not on so large a scale as at the Buffalos. The track wound between huge masses of granite, ever tending upwards, and presently we were able to get, through the haze, glimpses of distant mountains. Just about here Dr. Sutton had obtained specimens of the Baw Baw Berry, *Wittsteinia vacciniacea*, F. v. M., one of Victoria's only two representatives of the Ericaceæ or true heaths, but we did not see it until the return journey. "The Rocks" are about 4,000 feet above sea-level, and reminders of a more alpine flora were soon met with, a couple of Mountain Asters, *Aster celmisia*, F. v. M. (*Celmisia longifolia*, Cass.), large, daisy-like flowers, springing from a tuft of narrow silvery leaves, were eagerly picked as the greatest novelties up to the present. A specimen of the handsome Papilio butterfly made its appearance, and was promptly netted by our lepidopterist, who had secured several species of Xenica lower down. That beautiful pea-flowered shrub, *Oxylobium alpestre*, was just out of bloom, only an odd flower or two remaining, but quantities of the little purple Mountain Speedwell, *Veronica nivea*, and the deep magenta of the Trigger-plant, added colour to the scene. We were now among the Snow Gums, *Eucalyptus coriacea*, their white, twisted stems, about 15 to 20 feet high, showing well against the dark green, leathery leaves. The next sign of an alpine character was the singular epacrid, *Richea Gunnii*, of which only a few of the last white balloon-like flowers remained. A week or two earlier it must have been a lovely sight. A turn between the belts of Snow Gums revealed the first alpine morass, for the Baw Baw plateau consists of a series of morasses, or swamps, in winter full of water or covered with snow, in

summer yielding up their moisture to feed numerous creeks draining into the Thomson, the Tanjil, or the Tyers. These are edged with yellow sphagnum moss, and in summer bordered with flowering plants and shrubs of great variety. As a guide for the tourist in bad weather, poles have been set up at intervals to point out the track. On the whole, we were too late for conspicuous flowers, for, besides the Asters and Candolleas, which were in thousands, and were well worth the journey to see, the pale lemon bottle-brush flowers of the Mountain Bottle-brush, *Callistemon Sieberi* (Myrtaceæ), were perhaps the most conspicuous, though in places a deep orange composite, *Podolepis longipedata*, was fairly plentiful. We now passed between the wind-swept, granite-strewn mounds marked on the tourist map as Erica and Talbot, and by 8.30 a.m. had reached the two-roomed house thoughtfully provided for travellers by the Tourist Department. We had been told at the Bureau that we would find Talbot Creek dried up, and so it was near the house, but our guide soon found a plentiful supply of water a little further down the mountain side. The creek and mount take their name from Governor Talbot, who, it will be remembered, in January, 1907, inaugurated the track from Warburton to Walhalla.

Having reached the shelter-house, most of the party elected to stay in its vicinity exploring, taking photographs, or perhaps resting, but Messrs. Armytage, French, and myself were eager to explore to a greater distance, and perhaps reach Baw Baw itself, about six miles away, so Mr. Rawson readily agreed to show us some of the country off the beaten tourist track, which, by the way, is a mere horse-pad meandering between the trees and stones, and keeping to the higher ground, avoiding swamps and soaks as much as possible. We were soon exploring a marshy flat near one of the heads of Talbot Creek, where we found three rather rare orchids—viz., *Prasophyllum Suttoni*, Rogers and Rees, *P. brevilabre*, Hook f., and *Thelymitra venosa*, R. Br., the latter, which is new to Victoria, being found in hundreds growing on the edges of the dampest parts of the flat. The first-named was recently described by Dr. Rogers, of Adelaide, from the Buffalo plateau. The water seemed too clear for pond life, but scrapings from the edges of the pools were taken for another member of the party. Anything of interest was bottled or boxed, for what we did not want there were others ready to receive. We headed the South and North Cascade Creeks, finding in the morass feeding the latter *Cabomba pellata* (our only representative of the Nymphaceæ in Victoria), but not in flower, and therefore suggest that the picturesque glen in which it is situated might be called "Cabomba Glen," as a set-off to Tillicutty Glen, on

the western side of the track. Winding over the eastern flank of Mount St. Phillack, we came to Mr. Rawson's hut, overlooking a large flat plain of about 1,000 acres known as "Mustering Flat." At the hut we boiled the billy and had a snack. Meanwhile, distant thunder warned us not to delay too long, so we made for the tourist track again. While climbing a low hill we came across the dwarf Alpine Pine, *Nageia alpina*, F. v. M., its young tips showing a purplish bloom suggestive of flowers. At 3 p.m. we had just reached St. Phillack (5,140 feet), and the turn-off to Baw Baw, when the storm broke, and, heavy rain coming on, we had to make for "Camp-hole," a shelter formed by some granite rocks which have conveniently fallen so as to provide a fair-sized shelter, protected from the weather. Here we stayed for some time, the thunder and lightning being incessant, and grand, almost to create a feeling of fear. In a little while the storm passed and the sun shone out, so that we got fairly dry again. We still had four miles to traverse to the shelter-house, and wanted to visit a glen we had passed in the morning, where some fine beeches were growing, in search of the Alpine Lomaria. This fern was sparsely scattered throughout the plateau, generally amongst the stones, and always in the midst of tufts of the Tufted Meadow-grass, *Poa cæspitosa*, the alpine form of which is abundant all over the plateau. The first storm had come from the north-west, another was now fast approaching from the south-west: and we just reached the shelter-house as the rain came down in torrents. The wind howled, and the rain beat against the iron roof and walls so that it was almost impossible to hear one's self speak, while the clouds travelled at a tremendous pace only a few feet above the Snow Gums, and it grew so dark that we had to light candles. After about an hour of this the rain slackened a little, and we were able to go outside, and look down into the valley of the Thomson, filled up with clouds. Talbot Creek was now running, and our guide said there would be no further shortage of water for the summer. The shelter-house was barely large enough for our party, and, as only six stretchers are provided, four had to make themselves as comfortable as they could on the floor. Early to bed and early to rise was the rule, but during the night it rained and blew, and the daylight came long before we were able to venture out. In fact, some were speculating as to what chance there was of getting down the mountain if the rain kept on. However, about six it cleared up, and, though a jam-tin which had acted as a rain-gauge showed 1½ inches of rain had fallen, the ground round the house was comparatively dry, owing to the porous nature of the soil (disintegrated granite). Photographs were taken of the

Thomson Valley looking like an inland sea, and of the Candolleas and Asters, &c. Then we breakfasted and packed up, and were off on our fifteen-mile walk to Walhalla by 7.30 a.m. The morning was now beautifully fine, the sun shining brightly, and everything augured for a pleasant walk.

In addition to the plants already mentioned, the following were more or less abundant on the plateau :—*Drimys aromatica* (stunted forms), *Orites lancifolia*, *Aster stellulatus*, *A. myrsinoides*, *Senecio pectinatus*, *Micromyrtus microphylla*, *Epacris breviflora*, *Gentiana saxosa*, a delicate flower with fragrant perfume ; *Herpolirion novæ-zealandiæ*, the Sky Lily, a practically stemless plant, with flowers of a delicate blue almost hidden in grass-like leaves ; *Libertia paniculata*, the Branching Grass-iris ; *Helichrysum cuneifolium* ; *Drosera binata*, very plentiful on the edges of the pools ; *Podolepis longipedata*, and *Lycopodium clavatum*, Common Club-moss. Near the camping-place at "The Myrtles" the eucalypts *E. nitens* and *E. Delegatensis* were collected ; among the others noticed during the excursion were *E. capitellata*, *E. obliqua*, and *E. goniocalyx*. For many of these determinations I am indebted to Mr. J. R. Tovey, of the National Herbarium.

I have said little about the birds of the trip, as I hope one of the bird men will add some notes on that subject, but soon after leaving I noticed some parrots feeding on the ground, and on going to the spot found they had been eating the seeds of the False Dandelion, *Hypochæris radicata*. The two miles to "The Rocks" were accomplished in better time than on the previous day. A few photographs were taken here. In the crevices of the granite the little Rat-tailed Fern, *Asplenium flabellifolium*, found a home. Then down through the ferns to the myrtles. It was noticeable that, with the exception of the Cat-head Fern, *Aspidium aculeatum*, which occurs all over the plateau, and the Lomaria and Asplenium already mentioned, *Pteris incisa* was the first fern met with on our descent, then *Lomaria capense*, var. *procera*, next the tree-fern, *Dicksonia Billardiera*. At "The Myrtles" I secured a number of very small seedling beeches, which, when they become accustomed to the change of environment, I will be glad to hand over to members desirous of trying to grow an interesting souvenir of the mountains, and an excellent pot plant.

Then commenced about two miles of as fine fern and tall timber scenery as it has been my lot to see. Fern fronds 10 to 12 feet long, and 2 feet wide, were plentiful. Fine gums, 10 to 15 feet through and 200 to 250 feet high, abounded on either side. The usual fern gully vegetation prevailed—musk, hazel, blanket-wood, panax (native ash) ; the Christmas tree, *Prostanthera lasianthos*, was still in bloom, also the tea-tree,

Leptospermum flavescens; Clematis and Lyonsia festooned the shrubs, while in one or two places the beautiful blue fruits of *Billardiera longifolia* were conspicuous. The bright yellow flowers of *Senecio velleyoides* provided a golden border to the track, while smaller ferns of various kinds carpeted the ground. Lyre-birds and Coachwhip-birds gave a grand concert as we descended, but we had not gone more than half a mile from "The Rocks" when we walked into a mist which continued more or less all day, and quite robbed us of any views of the lower country we might have had had the day been clear. Soon after passing the 40-mile tree the fern scenery is left behind, and more or less open, undulating country is passed through. We reached the camping-place on the Tyers about mid-day, and had a short halt while the billy was boiled; then on again, our photographer taking a picture of the termites' mound on the way. At 43 miles the track turns a little to the west and runs down the side of Hotel Creek for a little way. By two o'clock we were back at Parker's Corner. Here our guide made a re-distribution of the packs, as he was near home, and dispensed with one of the horses. Instead of going into Harris by the road we had traversed on Saturday we turned towards Walhalla, still distant about six miles, with the Thomson Bridge about half-way. Not far from Parker's Corner is a lagoon, locally called a crater lake, in the midst of a red soil area. Our pond-hunter was anxious to try it, as he had not had much luck up to the present, so a slight detour was made to it. The depression is practically on the top of a hill, and is given as 1,530 feet above sea-level on the Geological Survey plan (Report on the Walhalla Goldfield, Department of Mines, 1901). The lake, or lagoon, which is about 150 yards in diameter, has probably been caused by the falling-in of caverns in basalt beneath. We then followed the road from Moondarra to Walhalla, and soon came in sight of the high hills between which the Thomson flows on its way to the lower country. The last mile or so of this was well bordered with spring-flowering shrubs, and would be worth traversing in October or November. As it wound down the spur we got many delightful glimpses of the Thomson valley, and of tributary creeks bordered with tree-ferns. The road makes several sharp turns, and down the steep slopes Bursaria bushes were in full bloom. On some of these were taken a fair number of a Cetonid beetle we had not seen before, which gladdened the heart of our coleopterist. Some flower-spikes of the Spotted Orchid, *Dipodium punctatum*, were seen, but the flowers were past their best. A very remarkable scale-insect, *Pulvinaria tecta*, var. *alba*, was seen on the Kunzeas. It appeared like loose, fluffy cotton-wool attached to the branches.

At the Thomson Bridge we were down to about 700 feet above sea-level. The scene here was very fine. A beautiful reach of the river, with steep, well-wooded banks, ends at the bridge, while just below is the junction of Stringer's Creek, on the sides of which, three miles away, Walhalla is built. Signs of the mining industry were here apparent, and naturally they increased as we got nearer the town, one of the most famous of Victorian gold-mining towns, now unfortunately languishing while new lodes are being sought for.

Even if we had seen nothing else, the walk up the valley of Stringer's Creek, named after the original discoverer of the locality in 1855, was worth the taking, and just then was particularly fine, as the slopes were decked with flowering bushes of Bursaria and *Helichrysum ferrugineum*, while fortunately there are some good gums and wattles still left; either the miners were unable to get at them or there has been a second growth, which is helping to obliterate the signs of man. Scores of feet below us, mostly on the other side of the stream, runs what appears like a toy railway, and whether the visitor approaches Walhalla by road or rail the journey from the Thomson is full of interest. Alongside the railway the common foxglove has become naturalized, and in the flowering season should make a good show. Most of us were not sorry when, about five o'clock, we reached the Star Hotel, where we found comfortable quarters, while soon the bath was requisitioned to the fullest extent. Here we bade good-bye to our guide, Mr. Rawson, who had treated us so splendidly and made the trip such a success, and we feel sure that anyone wanting to visit Baw Baw from the southern end cannot do better than place themselves in his hands. After tea those who were not too tired ventured out to get some idea of what has been aptly named the Switzerland of Australia.

Next morning (Tuesday) we entered on the final stages of our excursion. We all left by the first and only train for Moe at 6.40 a.m. The three miles to the Thomson was considered very fine, only to be eclipsed by the scenery as the little train climbed alongside the river itself with little more than air between us and the water, a couple of hundred feet below; then, turning a corner, winding up a tributary creek until the platform at Platina was reached, after a climb of 300 feet in two miles. This is the station for the Coppermine, a little township situated at the confluence of the Thomson and Cooper's Creek, where the old road from Moe to Walhalla crosses the river, and where a copper and platinum mine has been worked for some forty years with varying success. At present the mine is disused and the township stagnant; however, nearer the station an outcrop of limestone is being turned into building

lime, and bids fair to become a good industry. The valley of Cooper's Creek up which we were now travelling is a delightful bit of greenery, young Silver Wattles and gums growing in the highest state of perfection. The line makes a very fine horseshoe bend just beyond Platina, and in a few miles further we were at Harris, and had completed the round trip. It was now all down hill to Moe, which we reached about 9.30 a.m. Three of the party went on to town by the morning train ; the others decided to stay till the evening train—some to investigate the flat country towards Gooding for insects and pond life, while Mr. Whitmore and myself took a trip up the Narracan Valley line, running off to the south of the main line. This is a picturesque valley, the line crossing the stream nearly a dozen times in less than that number of miles. Numerous fine Blackwoods have been left along the stream by the settlers when clearing their farms. At Coalville signs of a former industry of the place indicated by the name were seen. Just beyond Narracan is a fine fall on the creek of about 25 to 30 feet, over which a good volume of water was pouring. Here a peculiar growth of bright pink, grass-like stems was covering some of the basalt stones near the water's edge, which puzzled me ; but on showing it to Mr. French later, he immediately asked if any willows grew near ; I said "Yes," so my pink grass turned out to be willow roots. On returning to Moe we found the others had not had a very exciting day. We managed to get an empty compartment in the train, and so had a very pleasant return journey to town.

I am indebted to several members for more detailed accounts of the objects collected.

Ornithology. — The following birds were noted during the Baw Baw Excursion :—Black Cockatoo, Butcher-bird, Buff-rumped Tit, Black-and-White Fantail, Black-faced Cuckoo-Shrike, Brown Flycatcher, Blue Wren, Coachwhip-bird, Crow, Fairy Martin, Gang-Gang Cockatoo, Harmonious Thrush, Lyre-bird, Laughing Jackass, Magpie-Lark, Musk Lorikeet, Nankeen Kestrel, Pipit, Pennant's Parrakeet, Pallid Cuckoo, Rosella, Red Wattle-bird, Spine-tailed Swift, Strepera, Sordid Wood-Swallow, Striated Tit, Spotted Ground-bird, White-throated Thickhead, White-shafted Fantail, White-throated Tree-creeper. White-backed Magpie, Yellow Robin, Yellow-rumped Tit, Yellow-throated Thickhead. Pennant's Parrakeet was the most common species noted, and evidenced a partiality for the flower-heads of the composite *Senecio velleyoides*, which grew luxuriantly on the range.—J. G. O'Donoghue.

Entomology.—The following are some of the more important insects collected during the Baw Baw excursion, for the identification of some of which I am indebted to Mr. F. Spry, of the National Museum :—

Coleoptera.—Lucanidæ : *Lissotus furcicornis*, Westw. Scarabæidæ : *Heteronyx*, sp. ; *Cacochroa gymnopleura*. Buprestidæ : *Stigmodera kerremansi*, *S. plagiata*, *S. assimilis*. Elateridæ : *Tetralobus murrayi*, *Chrosis illita*, *Monocrepidius flavipes*. Malacodermidæ : *Metriorrhynchus eremita*, *M. rufipennis*, var. *hæmorrhoidalis*, *Selenurus tricolor*. Mordellidæ :

Mordella dumbrelli. Lagriidæ: *Lagria grandis*. Tenebrionidæ: *Chalcopterus lævicollis, Apasis howittii, Adelium tenebrioides, Menephilus corvinus*. Cistelidæ: *Tanychilus striatus*. Curculionidæ: *Platyporopterus porrigineus, Gonipterus gibberus, Aterpus tuberculatus, Chrysolophus spectabilis*. Cerambycidæ: *Callidopsis præcox, Anastetha variplla, Mecynopus semivitreus, Phacodes obscurus, Zygocera cænosa*. Orthoptera: *Trigoniza maculata, Coryphistes*, sp. Homoptera: *Melampsalta abdominalis*. Diptera: *Clytocosmus helmsi*. Dermaptera: *Nesogaster ruficeps*.—C. French, jun.

Lepidoptera.—On the Baw Baw plateau specimens of the following butterflies were taken:—*Papilio macleayanus*, Leach, *Xenica correæ*, Olliff (20 males, 7 females), *X. kershawii*, Misk., *Heteronympha solanderi*, Waterhouse. A fair number of small moths were taken, including some Hydriomena, but they have not yet been identified.—E. O. Armytage.

Aquatic Zoology, &c.—It was expected that the high plateau would have had a distinctive fauna, but, with the exception of *Phreatoicus australis* and one or two small copepods not yet identified, the whole of the specimens could be collected within a few miles of Melbourne. The water-pools amongst the sphagnum were as clear and sparkling as if they had been filtered, but when portions of the sphagnum were examined in water, under the microscope, numerous forms of protozoa, rotifera, ostracoda, and copepoda were revealed. The isopod, *Phreatoicus australis*, Chilton, was fairly numerous in the sphagnum and in the mud under the stones in the bed of Talbot Creek. Attached to the under sides of stones, then quite dry, were numerous tubes composed of grains of sand cemented together, containing fat white grubs, resembling caddis larvæ. The tubes were 5 to 6 mm. in diameter, and about 20 mm. in length, and, being attached by one end to the stones, hung like stalactites. These were new to me, and have not yet been identified. Crawling about on the muddy bottom of the creek where a little water still remained were many caddis larvæ; these had constructed their "cases" of shining flakes of mica, which sparkled in the sun like gems as the larvæ moved about. Numerous grooved tracks were noticed on the still damp mud of the creek-bed, which were found to have been made by a small bivalved mollusc of the genus Pisidium. Several dipterous insects were taken as they skimmed the surface of the water, in which, no doubt, the early part of their existence had been spent. In several places when the herbage fringing the creek was disturbed countless thousands of a very small dipterous fly would be dislodged, and, after rising in the air for a few inches, would at once settle down again. In many pools tadpoles—very dark, almost black, in colour—were plentiful, while a few small frogs were collected under stones.

At the Tyers River, where we camped for lunch, caddis larvæ in their cases of grass stems or a hollow twig were noticed, also the globular or lenticular pupa-cases composed of grains of sand mentioned in the general report. The only other opportunity I had for collecting was at the so-called "Crater Lake," near Parker's Corner. This sheet of shallow water, almost circular in shape, had a fine growth of aquatic plants, and should prove a good collecting place for the microscopist; but, as our time was very limited, I could only sample it in one or two places. Mosquito and dragon-fly larvæ were very abundant. Here several species of cyclops, cladocera, and ostracoda were taken, whilst the vegetation sheltered many species of desmids, diatoms, and fresh-water algæ.

During the excursion diligent search was made for Peripatus, but without success. Planarians were also scarce, only one being taken, among the luxuriant vegetation on the southern slope of Mount Erica, where also *Talitrus sylvaticus* was very plentiful. This crustacean, it is

said, forms the principal food of the Lyre-bird. On the plateau, and down the track to the big timber, slugs were numerous on the branches of the wattle-trees, and, on account of their colour harmonizing with the bark, they looked like excrescences on the trees.

The following are the more important species observed :—Amphipoda : *Chiltonia subtenuis*, Sayce, *Talitrus sylvaticus*. Isopoda : *Phreatoicus australis*, Chilton, *Oniscus punctata*. Copepoda : A few small Harpacticids (species not yet determined), *Cyclops leuckarti*, *C. albidus*, *C. serrulatis*, and others not yet determined. Cladocera : *Chydorus globosus*, Baird, *Pleuroxis inermis*, G. O. Sars., *Camptocercus australis*, G. O. Sars., *Alona pulchella*, King. Ostracoda : Cypris, sp., *Cypridopsis minna*, King, *Ilyodromus ellipticus*, G. O. Sars.

Among a few insects collected, principally orthoptera, was a cockroach, Euzosteria, sp., of a brilliant metallic green colour, which is new to the National Museum collection.—J. Searle.

Cryptogamic Botany.—Among the cryptogams collected by Mr. C. French, jun., during the Baw Baw excursion, I have been able to identify the following mosses, hepatics, and lichens : — Mosses. — *Dicraneum dicarpon*, Hamsch. ; *D. angustifolium*, Hook. f. and Wils. ; *Bartramia pusilla*, Hook. f. ; *Funaria hygrometrica*, Hedwg. ; *Racomitrium symphodon*, Mitt., with *Cladonia delicatula*. Flk. ; *Hypnum cochlearifolium*, Schwaegr. ; *Sphagnum australe*, Mitt. Hepatics.—*Lepidozia lævifolia*, Hook. f. et Tayl. ; *Radula aquilegia*, Hook. f. et Tayl. ; *Reboulia hemispherica*. Raddi. ; *Lajeunia tumida*, Mitt. Lichens.—*Cladonia pyxidata*, Fr. ; *C. verticillata*, Hoffm. ; *C. coccifera*, L. ; *C. furcata*, Hoffm. ; *Thelotrema lepadinum*, Ach. : *Biatora cinnabarinum*, Sommersfeldt ; *B. intermixta*, Nyl. ; *Parmelia tenuirima*, Tayl. ; *Usnea barbata*, Dill. (very fine) ; a Steriocaulon, not known to me, but a beautiful little plant, and probably *Sticta fuliginosa*, Ach., which, if correct, is new for Victoria.—R. A. Bastow.

Micro-Fungi.—The following species of micro-fungi were collected by Mr. C. French, jun., during the Baw Baw excursion. Although no new species were obtained, several are additions to the Government Pathologist's herbarium, and a new host is recorded for *Cronartium Jacksoniæ*, P. Henn. — viz., *Pultenæa daphnoides*. Hysteriaceæ : *Hysterium puliaciæ*, Pers., on *Panax sambucifolius*. Phallaceæ : *Aseros rubra*, Labill. Uredineæ : *Caeoma clematidis*, Thuem., on *Clematis aristata* ; *Cronartium Jacksoniæ*, P. Henn., on *Pultenæa daphnoides* ; *Puccinia caricis* (Schum.), Reb., on *Carex paniculata* ; *P. coprosmæ*, Cke., on *Coprosma hirtella* ; *P. epilobii tetragoni*, D.C., on Epilobium, sp. ; *P. erechtitis*, M'Alp., on Erechtites, sp. ; *P. gnaphalii* (Spea.), P. Henn., on Gnaphalium, sp. ; *P. juncophila*, Cke. and Mass., on Juncus, sp. ; *P. saccardoi*, Ludw., on *Goodenia ovata* ; *Uromyces thelymitræ*, M'Alp., on *Thelymitra venosa* ; *Uromycladium notabile*, M'Alp., on *Acacia decurrens*. Ustilagineæ : *Ustilago utriculosa* (Nees.), Tul., on *Polygonum hydropiper*. Sphæropsideæ : *Phyllosticta correæ*, M'Alp., on *Correa Lawrenciana* ; *P. prostantheræ*, Cke., on *Prostanthera lasiantha* ; *Septoria anaxæa*, Sacc., on *Senecio vagus* ; *S. Martiniæ*, Cke., on *Senecio Bedfordi* ; *Melasmia eucalypti*, Cke. and Mass., on *Eucalyptus corynocalyx*. Melanconiales : *Pestalozziella circulare*, Cke. and Mass., on *Eucalyptus corynocalyx* ; *Glœosporium hedycaryæ*, Cke. and Mass., on *Hedycarya Cunninghami*. Hyphomycekæ : *Harpographum coryneliodes*, Cke. and Mass., on *Leptospermum scoparium*. In addition, a Phyllosticta has been observed on the leaves of *Hedycarya Cunninghami* which in all probability is a new species.—Chas. C. Brittlebank.

Algæ, &c.—A hurried examination of some wet sphagnum moss collected by Mr. Barnard has enabled me to make the following notes

on the contents :—Algæ.—Most of the algal constituents of the material are unicellular, only four filamentous forms being noticed. Diatoms are abundant, but of the several species represented those most common are of the genus Navicula. Of the Desmids the following genera in order of numerical occurrence are present :—Cosmarium, Closterium, Netrium, Penium, and Staurastrum. Of green filamentous algæ only sterile Mougeotia occurs, but of the Myxophyceæ, or blue-green algæ, there is one species of Anabœna, two of Oscillatoria, and one of Haplosiphon. Rhizopoda.—The sphagnum also harboured many rhizopods, as is the case in other countries, and I have noted species of Amœba, Vampyrella, Difflugia, and Pontigulasia.—A. D. Hardy.

All were so enamoured of the trip that it has been suggested to spend a week on the plateau, towards the end of next November, about the height of the season for the alpine flowers, when the experience gained on the recent trip would be of great service to those then able to go.—F. G. A. Barnard.

LIST OF RECENT VICTORIAN BRACHIOPODA.

By J. H. Gatliff and C. J. Gabriel.

(*Read before the Field Naturalists' Club of Victoria, 12th Jan.*, 1914.)

In 1890 the Royal Society of Victoria published a "Census of the Victorian Brachiopoda," by A. H. S. Lucas ; it comprised five species. Some of the generic names have been altered since, and we are enabled to add four more species, and now give a list of the whole of them, with references.

The Brachiopods used to be included in the Mollusca, but during recent years they have been separated, and are now classed with the Molluscoida, of which the other divisions are Tunicata and Bryozoa.

The Brachiopods or lamp shells are marine bivalves, stationary, being usually attached by a muscular pedicle or peduncle, which is situated near the apex or beak of the lower valve. The animal has a pair of ciliated oral arms, which cannot be protruded from the shell. It has no foot and no true gills.

The valves are calcareous and finely perforated, and in the Terebratulidæ the upper valve is furnished interiorly with a shelly loop. The sexes are separate.

Tryon states that over 4,000 extinct species of Brachiopods have been described from the Cambrian strata and upwards. Davidson, in his excellent monograph,* published in 1886, lists 130 living species. Many discoveries have been since made. Their distribution, both fossil and living, is world-wide.

* *Transactions Linnean Society, London*, vol. iv.

TEREBRATULINA CANCELLATA, Koch.

1843.—*Terebratulina cancellata*, Koch, in Küster, Conch.-Cab., vol. vii., p. 35, pl. 2*b*, f. 11–13.
1843.—*Terebratula*, species *quædem incognita*, Menke, Moll. Nov.-Holl., p. 35, No. 192 (*fide* Davidson, Trans. Linn. Soc. Lond., vol. iv., 1886, p. 35).
1846.—*Terebratula cancellata*, Koch. Sowerby, Thes. Conch., vol. i., p. 358, pl. 71, f. 93–95.
1860.—*Terebratula* (*Terebratulina*) *cancellata*, Koch. Reeve, Conch. Icon., vol. xiii., pl. 4, f. 13.
1880.—*Terebratulina cancellata*, Koch. Davidson, *Challenger*, Zool., vol. i., p. 37, pl. 1, f. 11–16.
1886.—*Terebratulina cancellata*, Koch. Davidson, Trans. Linn. Soc. Lond., vol. iv., p. 35, pl. 6, f. 1–8.
1887.—*Terebratella cancellata*, Koch. Tate, T.R.S. S.A., vol. ix. (for 1885–6), p. 110.
1890.—*Terebratulina cancellata*, Koch. Lucas, P.R.S. Vic., vol. ii., n.s., p. 48.
1902.—*Terebratulina cancellata*, Koch. Hedley, Mem. Austr. Mus., vol. iv., p. 288.
1910.—*Terebratulina cancellata*, Koch. Verco, T.R.S. S.A., vol. xxxiv., p. 95.

Hab.—Port Phillip Heads (J. B. Wilson); off East Moncœur Island (*Challenger*).

TEREBRATULINA CAVATA, Verco.

1910.—*Terebratulina cavata*, Verco, T.R.S. S.A., vol. xxxiv., p. 95, pl. 28, f. 1–5.

Hab.—Port Phillip Heads (J. B. Wilson).

Obs.—Size of type: Length, 16.25; width, 11.5; depth 7 mm. "*T. cancellata*, Koch, is closely allied, but is flatter, has more numerous, rounder, rougher, riblets, arising by irregular intercalation."

TEREBRATULINA RADULA, Hedley.

1904.—*Terebratulina radula*, Hedley, P.L.S. N.S.W., vol. xxix., p. 209, pl. 10, f. 48–50.

Hab.—Dredged off Wilson's Promontory.

Obs.—Size of type: Length, 2.95; height, 3.85; breadth of conjoined valves, 2 mm. "Both valves are sculptured by about a dozen bold, radiating, granose ribs."

T. flindersi, Chapman, a fossil obtained from bores in the Mallee, near Ouyen, is a very similar shell, but not so triangular in form.

MAGELLANIA FLAVESCENS, Lamarck.

1819.—*Terebratula flavescens*, Lamarck, An. s. Vert., vol. vi., p. 246.

1835.—*Terebratula australis*, Quoy and Gaimard. *Astrolabe*, Moll., vol. iii., part 2, p. 551, pl. 85, f. 1–5.
1835.—*Terebratula recurva*, Quoy and Gaimard. *Id.*, p. 554, pl. 85, f. 10–11.
1858.—*Waldheimia flavescens*, Lamarck. Adams, Genera Recent Moll., vol. ii., p. 575, pl. 130, f. 3, 3*a*, 3*b*.
1875.—*Waldheimia australis*, King. Woodward, Man. Moll., p. 5, f. 5, 6, and p. 364, f. 149, 150.
1878.—*Waldheimia flavescens*, Lamarck. T.-Woods, P.R.S. Tas. (for 1877), p. 57.
1880.—*Waldheimia flavescens*, Lamarck. Davidson, *Challenger*, Zool., vol. i., p. 41, pl. 3, f. 10–12.
1886.—*Waldheimia flavescens*, Lamarck. Davidson, Trans. Linn. Soc. Lond., vol. iv., p. 41, f. 3–8 in text and pl. 7, f. 6–19.
1887.—*Waldhemia flavescens*, Lamarck. Tate, T.R.S. S.A., vol. ix. (for 1885–6), p. 110.
1890.—*Waldheimia flavescens*, Lamarck. Lucas, P.R.S. Vic., vol. ii., n.s., p. 48.
1901.—*Magellania flavescens*, Lamarck. Tate and May, P.L.S. N.S.W., vol. xxvi., p. 441.
1902.—*Magellania flavescens*, Lamarck. Hedley, Mem. Austr. Mus., vol. iv., p. 289.
1910.—*Magellania flavescens*, Lamarck. Verco, T.R.S. S.A., vol. xxxiv., p. 96.

Hab.—Dredged in bunches, Western Port, in 6 to 8 fathoms; Port Phillip Heads (J. B. Wilson); Hobson's Bay, Port Phillip; Portland. (National Museum, Victoria.)

MAGASELLA VERCOI, Blochmann.

1910.—*Magasella vercoi*, Blochmann, T.R.S. S.A., vol. xxxiv., pp. 91 and 98, pl. 27, f. 1–5.

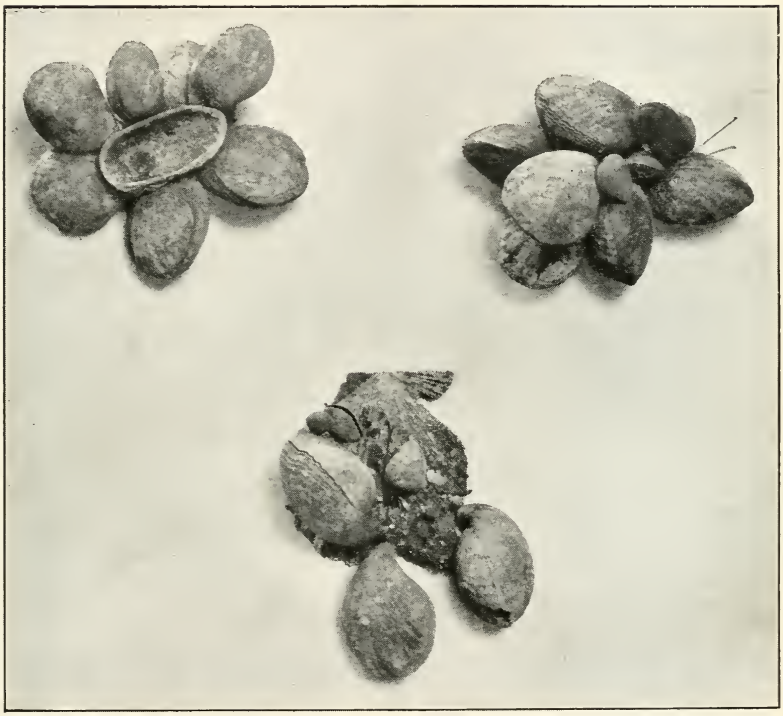
Hab.—Port Phillip Heads (J. B. Wilson).

Obs.—Size of type: Length, 7.5; breadth, 4; thickness, 4.8 mm. Dr. Verco remarks:—"This is the shell which Tate recorded as *Megerlia willemoesi*, Davidson, from 22 fathoms in Encounter Bay." Mr. Lucas, in his paper already referred to, made the same error.

MAGASELLA CUMINGI, Davidson.

1852.—*Terebratella* (?) *cumingii*, Davidson. Ann. and Mag. Nat. Hist., 2nd ser., vol. ix., p. 368.
1852.—*Terebratella* (?) *cumingii*, Davidson, P.Z.S. Lond., p. 78, pl. 14, f. 10–16.
1858.—*Magas cumingii*, Davidson. Adams, Genera Recent Moll., vol. ii., p. 577, pl. 131, f. 1, 1*a*.

PLATE XI.



MAGELLANIA FLAVESCENS, LAMARCK.

1861.—*Terebratula* (*Bouchardia*) *cumingii*, Reeve, Conch. Icon., vol. xi., pl. 8, f. 29.
1861.—*Terebratula* (*Bouchardia*) *fibula*, Reeve, *id.*, f. 30.
1867.—*Magas cumingi*, Davidson. Angas, P.Z.S. Lond., p. 935.
1880.—*Bouchardia cumingii*, Davidson. Hutton, Man. N.Z. Moll., p. 178.
1880.—*Magasella cumingii*, Davidson. *Challenger*, Zool., vol. i., p. 48.
1887.—*Magasella cumingi*, Davidson. Trans. Lin. Soc. Lond., vol. iv., p. 97, pl. 17, f. 23–32.
1890.—*Magasella cumingi*, Davidson. Lucas, P.R.S. Vic., vol. ii., n.s., p. 49.
1901.—*Magasella cumingi*, Davidson. Tate and May, P.L.S. N.S.W., vol. xxvi., p. 442.
1910.—*Magasella cumingi*, Davidson. Verco, T.R.S. S.A., vol. xxxiv., p. 97.

Hab.—Bass Strait.

KRAUSSINA ATKINSONI, T.-Woods.

1878.—*Kraussia atkinsoni*, T.-Woods. P.R.S. Tas. (for 1877), p. 57.
1887.—*Kraussina atkinsoni*, T.-Woods. Davidson, Trans. Lin. Soc. Lond., vol. iv., p. 127, pl. 21, f. 5–6.
1901.—*Kraussina atkinsoni*, T.-Woods. E. A. Smith, Jour. of Conch., vol. x., p. 116.
1901.—*Kraussina atkinsoni*, T.-Woods. Tate and May, P.L.S. N.S.W., vol. xxvi., p. 442.
1910.—*Kraussina atkinsoni*, T.-Woods. Verco, T.R.S. S.A., vol. xxxiv., p. 99.

Hab.—Shoreham (Gatliff) and San Remo (T. Worcester), Western Port.

Obs.—Mr. Davidson remarks :—"*K. atkinsoni* is at once distinguished from its congeners by being the only smooth species of the genus with which we are acquainted." Mr. E. A. Smith records it as being found at Algoa Bay, Cape Colony.

KRAUSSINA (MEGERLINA) LAMARCKIANA, Davidson.

1852.—*Kraussia lamarckiana*, Davidson. P.Z.S. Lond., p. 80, pl. 14, f. 22, 23.
1858.—*Kraussia lamarckiana*, Davidson. Adams, Genera Recent Moll., vol. ii., p. 579, pl. 131, f. 4.
1862.—*Kraussia lamarckiana*, Davidson. Chenu, Man. de Conch., vol. ii., p. 206, f. 1,057.
1875.—*Kraussia lamarckiana*, Davidson. Woodward, Man. Moll., p. 367, f. 156.

1878.—*Kraussia lamarckiana*, Davidson. T.-Woods, P.R.S. Tas. (for 1877), p. 57.
1880.—*Kraussia lamarkiana*, Davidson. Hutton, Man. N.Z. Moll., p. 178.
1880.—*Kraussina lamarckiana*, Davidson. *Challenger*, Zool., vol. i., p. 53, pl. 4, f. 9.
1887.—*Kraussina lamarckiana*, Davidson. Tate, T.R.S. S.A., vol. ix. (for 1885–6), p. 111.
1887.—*Kraussina* (*Megerlina*) *lamarckiana*, Davidson. Trans. Lin. Soc. Lond., vol. iv., p. 124, pl. 21, f. 7–11.
1890.—*Kraussina lamarckiana*, Davidson. Lucas, P.R.S. Vic., vol. ii., n.s., p. 49.
1901.—*Kraussina* (*Megerlina*) *lamarckiana*, Davidson. Tate and May, P.L.S. N.S.W., vol. xxvi., p. 442.
1910.—*Kraussina* (*Megerlina*) *lamarckiana*, Davidson. Verco, T.R.S. S.A., vol. xxxiv., p. 98.

Hab.—Under stones at low water, Williamstown (A. H. S. Lucas); Frankston, Port Phillip, and Portland (T. Worcester): Western Port.

CRYPTOPORA BRAZIERI, Crane.

1886.—*Atretia brazieri*, Crane, P.Z.S. Lond., p. 183.
1887.—*Atretia brazieri*, Crane. Davidson, Trans. Lin. Soc. Lond., vol. iv., p. 175, pl. 25, f. 16–17*a*.
1902.—*Atretia brazieri* (Davidson), Crane. Hedley, Mem. Austr. Mus., vol. iv., p. 289.
1906.—*Cryptopora brazieri*, Crane. Hedley, P.L.S. N.S.W., vol. xxxi., p. 467, pl. 36, f. 1, 2.
1910.—*Cryptopora brazieri*, Crane. Verco, T.R.S. S.A., vol. xxxiv., p. 94.

Hab.—In about 40 fathoms, off Ninety-Mile Beach.

A NOTE ON PARTURITION IN PERAMELES.

By GERALD V. DOYLE.

(Communicated by Dr. T. S. Hall, M.A.)

(*Read before the Field Naturalists' Club of Victoria, 13th Oct.*, 1913.)

THE distinction created by bushmen and others between the domestic animal and the marsupial as regards the act of parturition has often been shown to be quite erroneous, the act in the two types—the domestic animal being typical and the kangaroo representing the marsupial—being essentially the same, though the absence of a well-developed placenta in the marsupial appears to create a distinction. The passage in one case of an embryo, and in the other of a well and completely

developed fœtus, through the vaginal canal constitutes the essential act.

The theory that the marsupial embryo grows from the nipple of the mother cannot hold ground, for several reasons—(1) If the embryo were an outgrowth from the maternal nipple there would be organic union between the embryo and mother. The fact that the embryo can easily be detached from the nipple amply disproves this point. (2) The embryo has been obtained just after parturition has occurred, and before the mother had placed it on the nipple. This is a conclusive piece of evidence, and breaks down the line of demarcation between the two types before-mentioned.

The specimen which formed the subject of this investigation was sent to the biological school of the Melbourne University. The sender had already preconceived a theory bearing on the subject of parturition, which he formulated in these words :— " The embryo passes down on either side through what I take to be the inguinal canal, and through the openings directly into the pouch and on to the nipple, where it remains. The opening is only patent in preparation for parturition, and then begins to close, seen commencing on the left side of the specimen "

The animal on which this extraordinary theory rested, on examination was found to be a fully-grown female specimen of *Perameles obesula*. The pouch was in the normal position, and on the wall of the pouch just below the nipples were two openings, one on each side, that on the right side being larger than that on the left, and being on a slightly lower plane. Thus the openings were seen to be symmetrical neither in size nor in position. This is an important point, as an opening for such a function as parturition would of necessity be symmetrical from the very order of things.

In carrying out this investigation the objects kept in view were—

(1) To find out where the openings in the pouch led to.
(2) To ascertain what connection, if any, they had with parturition as it normally occurred in the animal.

The following procedure was carried out :—The pouch was split open longitudinally in the median line, and the flaps turned aside. Then the skin, except that in the region of the anus, vagina, and pouch, was stripped off, leaving exposed the muscles forming the abdominal wall. When this was done, the pouch itself was carefully dissected off the muscles, but the position of the holes in the pouch to the underlying muscles was carefully noted. It was then noticed that the muscles attached to the pubic symphysis were torn and ragged and had gaps in them, and that the openings in the pouch led into these

gaps. The pubic bone on the right side was found to be broken. The pubic symphysis was then divided, and the whole genito-urinary system dissected out. The system was then examined very carefully with the aid of a powerful hand lens to see if there were any deficiencies in the walls of the different viscera. None were found. Then, by the aid of a bristle, the absolute and direct continuity of the vaginal canal with the uterus was proved. Thus the holes in the pouch were seen to open into muscle only, and, since they had no connection with the genital organs, it is obvious that they could have nothing to do with parturition, and could have neither a direct nor even indirect effect on that function. The breaking of the bone seems to point to the trap, as the specimen was a trapped one, or else to a severe accident. The accident causing the fracture may very possibly have caused the tearing in the muscles and skin, resulting in the irregular openings in the pouch and the marked laceration of the thigh muscles already mentioned.

On reviewing the theory already formulated and the investigation now finished, the following points seemed to the observer to clinch the argument, and satisfactorily and completely to disprove the theory—

(1) The inguinal canal is never open after birth. If it is, it is a pathological condition, and not due in any way to a normal physiological function.

(2) If the inguinal canal did remain open, all that could pass down into it would be a loop of intestine, forming a hernia, and hernia is rare, if not unknown, in quadrupeds.

(3) The fact of the openings closing after parturition is questionable, because, from their size, the time elapsing between two successive pregnancies of the animal would not be long enough for them to heal.

(4) The presence of two such weakenings in the abdominal wall would be a source of great danger to the animal when undergoing any unusual strain.

(5) Peritonitis would very probably supervene if such openings as were in the pouch were in communication with the abdominal cavity.

So the results of the investigation disprove absolutely the theory outlined, and maintain the older and correct idea of the genito-urinary system as described by zoologists.

In conclusion, I would like to set a problem to all who believe the original theory: How long would the genus Perameles—or any other genus—last if the act of parturition resulted in a fractured pelvis, as the theorist in this case, anyway, seems to demand?

The Victorian Naturalist.

Vol. XXX.—No. 12. APRIL 9, 1914. No. 364

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 9th March, 1914.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 40 members and visitors were present.

REPORTS.

A report of the excursion to Beaumaris on Saturday, 14th February, was given by the leader, Mr. F. Chapman, A.L.S., who said that, notwithstanding a high tide preventing much investigation of shore-life, enough interest was furnished by the fossils obtained from the cliff to make up an instructive afternoon.

A report of the excursion to Heidelberg on Saturday, 28th February, was given by the leader, Mr. J. Stickland, who said that, owing to the dry season, the pools usually visited were very low, and the water difficult of approach; however, the material collected yielded a good variety of forms when examined at home under the microscope.

A report of the junior excursion to the Zoological Gardens on Saturday, 7th March, was given by Mr. G. A. Keartland, who said that the attendance was very small. However, with the help of his co-leader, Dr. Leach, a deal of general information regarding the various animals, birds, &c., seen had been given to inquiring members.

GENERAL BUSINESS.

The president said that since last meeting a letter had been received from Mr. H. W. Hunt requesting the Club to appoint two representatives to attend a meeting of those interested in the prevention of cruelty to birds. The committee had appointed Mr. J. Gabriel and himself to represent the Club, and they both attended the meeting, which was held on 26th February. Considerable discussion took place, and it was decided that a petition should be drawn up and presented to Parliament asking that a bill be passed to prohibit the overcrowding, by dealers and others, of our native birds in small cages. A draft copy of the proposed petition had come to hand, and was read to the meeting.

Mr. G. A. Keartland said that he had always kept birds in captivity for the purpose of observation. He considered that the Club would bring itself into disrepute if it identified itself with a movement to prevent the keeping of birds in captivity, which, in a great many cases, did not involve cruelty.

Mr. J. Gabriel said that the mover of the motion at the first meeting did not propose prohibiting the keeping of birds in captivity, provided fair room was allowed to each bird. He was surprised at the wording of the petition as read by the chairman.

Mr. Kershaw said that the real purpose of the petition was to prevent the overcrowding of birds in cages in the markets and in the streets for the purpose of sale.

After further discussion, in which Messrs. Hardy and Searle took part, Mr. O. Rosenhain moved that the Club support that portion of the petition relating to the wanton cruelty of overcrowding of birds in cages by dealers, the portion relative to the keeping of birds by private persons to be eliminated. This was seconded by Mr. J. Gabriel, and carried unanimously.

The chairman said that the honour of Doctor of Science had been conferred on Professor Spencer by his *alma mater*, the University of Manchester, and mentioned that he was a past president of the Club. He therefore moved that the congratulations of the Club be forwarded to him. This was seconded by Mr. F. G. A. Barnard, and carried.

It was decided, on the motion of Mr. J. Searle, seconded by Mr. J. Stickland, that the committee make inquiries with regard to the preservation of certain pools along the banks of the Yarra, which may be destroyed when the beautification scheme is being carried out.

PAPERS READ.

1. By Mr. J. G. O'Donoghue, entitled "Notes on the Victorian Lyre-bird, *Menura victoriæ*."

The author referred to the great changes which spread of settlement invariably makes in any locality, and gave a very interesting account of the habits and peculiarities of the Lyre-bird, as observed by him some fifteen years ago in the Crooked River district, North Gippsland, where the birds were almost as numerous as sparrows or starlings in the suburbs of Melbourne. Then the rabbit and fox were unknown in the district; now the valley teems with both, and as a natural consequence the Lyre-bird has almost disappeared.

Mr. J. Gabriel congratulated the author on his interesting paper, and said that he concurred in the author's opinion that the Lyre-bird was not so shy as was imagined, and related an incident in support.

Mr. G. A. Keartland said that the fox and the gun were undoubtedly responsible for the rapid disappearance of the Lyre-bird.

In reply to a question by Mr. A. D. Hardy, the president said that several Lyre-birds had been introduced into the National Park, Wilson's Promontory, and so far as he was aware they were doing well.

2. By Mr. J. Gabriel, entitled "The Incubation of the Mutton-bird's Egg."

The author said that during the visit to the Furneaux Group of islands in November, 1893, one of the inhabitants informed him that the incubation of the eggs of the Mutton-bird took eight weeks. As his informant made the statement so confidently, he accepted it as correct until a few years ago, when he determined to test the subject himself. With the assistance of some friends, several tests had been made both by placing eggs under a domestic hen and in an incubator, with the result that the period of incubation was forty-six days.

The president congratulated the author on the information supplied, which had long been a matter of doubt.

Mr. G. A. Keartland asked whether the eggs were kept warm from the moment they were taken from the burrow until they were placed in the incubator, to which Mr. Gabriel answered in the negative.

3. By Mr. J. W. Audas, F.L.S., entitled "The Grampians Revisited."

The author dealt principally with the Mount Difficult Range, which necessitated a very arduous climb, though the trip was in other respects delightful. He noted on the summit the interesting composite *Olearia speciosa*, described in 1907 as a species new to science from specimens grown in the Royal Botanic Gardens, Kew, England, from seed forwarded from the Botanical Gardens, Melbourne. On the slopes of a gully the orchid *Caladenia congesta* was seen in two different forms. He also visited Mount Rosea by a different route than that followed on his previous visit, finding *Pultenæa rosea*, from which this peak takes its name, in full bloom. At a part called "The Terraces" he observed a specimen of the pine *Callitris rhomboidea* forty feet high and four feet in circumference at its base.

Mr. F. Pitcher asked if the author had found anything out of the common on Mount Difficult, to which he replied that the vegetation was very similar to other parts of the Grampians.

EXHIBITS.

By Mr. J. W. Audas, F.L.S.—Eleven species of dried plants endemic to Victoria and peculiar to the Grampians and south-west, including *Olearia speciosa*, Hutch., and *Thryptomene Mitchelliana*, F. v. M.

By Miss Bury.—A specimen of Kalimnan ironstone, with fossils, obtained during the Club excursion to Beaumaris, 14th February, 1914.

By Mr. A. D. Hardy, F.L.S.—*Hapalosiphon Hibernicus*, an alga, from sphagnum collected by Mr. F. G. A. Barnard during the Club excursion to Mount Baw Baw.

By Mr. J. Searle.—Specimens of large earthworms from the Baw Baw plateau, also freshwater worms from a pond in the Zoological Gardens.

By Mr. P. R. H. St. John.—Forty-eight hand-coloured photographs of Australian plants (principally Sandringham flora), executed by Miss Effie Baker, of Black Rock.

By Mr. J. R. Tovey.—A specimen of orchid *Prasophyllum flavum*, R. Br., collected by Mr. C. French, jun., near Mount Baw Baw, Victoria, January, 1914. This orchid is a native of New South Wales and Queensland, and has not been previously recorded for Victoria.

After the usual conversazione the meeting terminated.

EXCURSION TO BAW BAW.

Owing to want of space in the last *Naturalist* the following notes on the physiography of the Baw Baw Range had to be omitted (in page 202) from the printed report. As their publication may help to a better understanding of the locality, opportunity is taken to give them now, together with the names of some additional species in different groups which have since been identified :—

"A few words here about the alpine plateau we had come so far to see may be of interest. The Baw Baw Range proper may be considered to extend from Mount Whitelaw to Mount Erica, a distance of rather more than eight miles in a straight line and in the direction of N.W. and S.E., forming the watershed between the Thomson on the east and the Tanjil and Tyers on the west. The ridge generally is not more than half a mile wide, except where there is a south-westerly spur or branch from Mount St. Phillack to Baw Baw itself. Seeing that the height of Erica is given as 5,000 feet and Mount Whitelaw as 4,878 feet, with Mt. St. Phillack about midway as 5,140 feet, and that neither of these is a prominent peak, and that its outline, looked at from a distance, is fairly level, the plateau probably averages about 4,800 feet above sea-level. The tourist map shows three peaks—Baw Baw, Mueller, and Tyers —on the western side, the latter being the lowest, and apparently isolated from the main range, but it is probably Baw Baw, Mueller, and Erica that one sees as the three peaks when standing on Mount Donna Buang at Warburton. The tourist track between Erica and Whitelaw, measuring 9 miles 48 chains, is undulating, but none of its hills can be much more than a couple of hundred feet. The great interest of the plateau to the naturalist is that it contains the nearest truly alpine vegetation to Melbourne, while it seemed to those who had visited the Buffalo plateau to be much more alpine in its character. Sphagnum moss borders all the lakelets and swamps,

while the shrubs surrounding them are mostly low-growing and spreading, showing the presence of high winds and snow in winter. The yearly rainfall is probably over 60 inches, and for several months the plateau is a snow-covered waste. Most of the notable plants belong to the Compositæ, Epacridæ, or Myrtaceæ."

Land Mollusca: *Paryphanta atramentaria*, Shuttleworth; *Flammulina subdepressa*, Braz.: and *F. fordei*, var. *M'Coyi*, Petterd.

Crustacea: *Atyloides gabrieli*, occurring in the Sphagnum.

Protozoa: *Spirostomum ambiguum*, and several not yet identified.

Botany: The orchid *Prasophyllum flavum*, R. Br. (new for Victoria), previously recorded for New South Wales and Queensland.

Freshwater Alga: *Hapalosiphon Hibernicus*, W. and G. S. West, occurring in the Sphagnum.—F. G. A. Barnard.

EXCURSION TO HEIDELBERG.

About six members took part in the excursion to Heidelberg on Saturday, the 28th February, which was set down for pond-life. The first pond visited—that by the roadside, near the bridge over the Yarra—was found to be nearly dried up, as was anticipated, after the long-continued spell of dry weather. Those who essayed to reach what water remained were nearly engulfed in slimy mud. Leaving this pool, we proceeded to two others and obtained more satisfactory results, so that our bottles were finally filled with fairly good material. Some of the larger denizens of the ponds, such as the brown hydra, the bug commonly known as the water-boatman, *Notonecta glauca*, sundry crustaceans, &c., were examined on the spot, and appeared to interest the party considerably. On the whole, we think a pleasant and profitable afternoon was spent. A microscopic inspection of our material yielded the following results:—Protozoa were found to be numerous. Of these some amœboid forms, the shell-forming rhizopod *Arcella vulgaris*, and a few heliozoa represented the Sarcodina. The Mastigophora, or flagellates, noted included *Astasia tricophora*, Ehr., and *Anthophysa vegetans*, Müller. The latter are very minute protozoa which form clusters, the clusters being attached to water-weeds by stalks of comparatively considerable length. The Infusoria or ciliated division were more numerous, and included the following:—*Epistylis flavicans*, Ehr., *E. plicatilis*, Ehr., two or three species of Vorticelli, *Trachelocerca olor*, Müll., *Coleps hirtus*, Ehr., a hypotrichous form, probably *Euplotes harpa*, Stein., and also a large group

of tube-building protozoa of the genus Stichotricha, one of which had taken up its abode in the tube of a stentor still inhabited by its rightful owner, but the result did not seem to be very satisfactory to the intruder. Rotifers noted included *Brachionus bakeri*, Ehr., Stephanops (probably *lamellaris*, Ehr.), *Limnias ceratophylli*, Schrank, *Melicerta ringens*, Ehr., and many beautiful clusters of *Megalotrocha alboflavicans*, Ehr. These last are spoken of by Hudson and Gosse as being rare, but our experience seems to indicate that they are quite plentiful in many of the ponds near Melbourne. Of Entomostraca, three orders were represented, but the number seen was not large. Desmids and other algæ were conspicuous by their absence.—J. Stickland.

SOME COASTAL PLANTS: THEIR SHELTER VALUE AND FIRE DANGER.

By T. S. Hart, M.A., B.Sc.

(*Read before the Field Naturalists' Club of Victoria, 9th Feb.*, 1914.)

The prevalent coastal tea-tree scrub is well known to be highly inflammable; but any extensive removal of vegetation on an open, sandy coast, either to make clear fire-breaks or by general thinning, would be likely to lead to serious and increasing sand-drifting. The practical problem becomes that of preserving a sufficient covering of vegetation of the least inflammable kinds possible.

I desire to indicate how improvement may be made while still utilizing the native plants of the coastal scrubs. Besides observations made previously on the manner of growth of some of the plants, I have recently made some rough tests of the ease of ignition of the foliage of several species, including a few introduced plants which are quite at home in the same situations. The tests were made by heating on a rack over a gas-ring, with uniform flame during each series of tests. The results may be summarized as follows:—

1. Most inflammable, quick ignition, and plenty of flame—
   Leptospermum lævigatum, Coast Tea-tree, and
   Leucopogon Richei, Native Currant.
2. Easily ignited—
   Bursaria spinosa, Sweet Bursaria.
   Correa alba, White Correa.
   Casuarina quadrivalvis, Drooping Sheoke.

Under moderate heat the sheoke glowed and burned away rapidly without flame. This manner of burning and the character of the plant would make it less dangerous as a contributor to a fire.

3. Fire-resisting plants—

Acacia longifolia, var. *sophoræ*, Coast Wattle.
Rhagodia Billardieri, Sea Berry.
Tetragonia implexicoma, Warrigal Cabbage.
Muehlenbeckia adpressa, Climbing Lignum.
Myoporum insulare, Boobialla.

—especially the last three, but the others were not far behind.

Of introduced plants tested, *Coprosma lucidum*, Looking-glass Plant, must be put with the strongly resistant plants.

In *Cytisus proliferus*, Tagasaste or Tree-lucerne, the leaves caught more easily than Bursaria, though young stems were not ignited so readily. Foliage of *Tecoma capense*, Tamarix, and Plumbago caught quite easily.

In addition, I looked for any effect of the various plants on the recent fire at Chelsea. The fire was largely in young tea-tree; the proportion of other species in the scrub at this place is low. An ordinary cart-track, 8 feet or so in width, was often sufficient to secure that tea-tree on its farther side was only scorched, though at a very short distance beyond the fire regained its full destructiveness. A much wider space without tea-tree would be necessary for a safe fire-break. At one place where there was much coast wattle at one side the width of the fire was much lessened, but other causes may have assisted.

The shelter required for such a coastal residential area needs to check the movements of the sand; to protect house and garden from wind and sand and from view to an extent varying with the individual taste; to protect from the sun, and to be pleasing to the eye.

We may regard the vegetation from this point of view as of four parts—(1) the main shelter of shrubs and small trees from the height of a hedge to trees under the shade of which one can comfortably sit: (2) the bushes and smaller plants which thicken the lower parts of the scrub, and are especially important on the seaward side; (3) the smaller ground plants; (4) scattered trees mixed with the scrub, and often standing up above it. These diversify the aspect of the scrub, but in usual quantities do not much alter its shelter value or the danger of fire.

The main shelter about Chelsea approaches a pure tea-tree scrub. *Acacia longifolia*, var. *sophoræ*, is not in large proportion. The Coast Honeysuckle belongs with the trees which rise above the scrub. The Boobialla, if present, is not here common. Elsewhere Coast Wattle and Boobialla are more abundant. Near Devonport, Tasmania, there is a coastal scrub in which Coast Wattle and Boobialla are the chief constituents, without Leptospermum. This is associated with a

coarse shingle, with much less fine sand. At one place near Ulverstone, Tasmania, as seen from the railway, Coast Wattle is strongly predominant, with a little Boobialla: no Leptospermum was noticed at this place.

The danger from fire can be greatly reduced by planting or encouraging the natural growth of fire-resisting vegetation partly mixed with the tea-tree, but in part to the complete exclusion of tea-tree over strips sufficient to act as fire-breaks. At the same time a diversified scrub, much more pleasing to the eye than pure tea-tree, would be formed.

Of native plants the Boobialla takes first place. It is strongly resistant to fire; it is easily propagated—even large cuttings strike readily in sandy soil; it is of rapid growth. Trimmed to one main stem, it gives a fine shade overhead. A row of four trees, a few years old, at Brighton Beach station, shade a strip about one chain long, and are about 13 feet high. If cut and made to branch low it will make a good hedge. It will flourish in full exposure and carry foliage well down to the ground, making a good protection against wind. Its colour, bright green, will considerably enliven the dull aspect of the tea-tree. More than one variety of Myoporum is called Boobialla. Other forms would be useful as far as they share these characters.

Coast Wattle will also grow tall enough to give some overhead shelter. In full exposure it makes extensive low patches, or it may grow taller and keep its foliage well down to the ground on the exposed side. It roots from buried branches — a character which increases its value for holding sand. Sometimes it is attacked by a gall-producer. Good plants of either this wattle or of Boobialla are better shelter against wind than old tea-tree, which goes bare underneath.

If tea-tree is used for wind-breaks it should be interrupted at intervals by considerable patches of non-inflammable plants. Tea-tree hedges should not lead up to the vicinity of buildings, and a tea-tree hedge or wind-break alongside a cart track is a waste of a good opportunity to secure some protection from fire by non-inflammable vegetation.

Of the introduced plants, *Coprosma lucidum* can also be used for hedges. Box-thorn must be regarded as inadmissible. Tree-lucerne is less resistant to fire.

Of the smaller plants, Muehlenbeckia appears quickly after a fire. It was most advanced of all on the burnt area at Chelsea five weeks after the fire. Plants of tea-tree and of honeysuckle which had only been scorched were also shooting again, and partly burnt plants of *Correa alba*.

Correa alba is decidedly at its best in full exposure; where sheltered it is more straggly. It has the power of rooting from

buried branches, which adds to its value on the outside edge of the shelter.

Leucopogon Richei, in quantity, would be an element of danger, being easily ignited.

Tetragonia implexicoma and *Rhagodia Billardieri* are both very useful in thickening the protection on the seaward side. Tetragonia covers the ground often just behind the first shelter, but can get started with only the shelter of the grasses outside the shrubs, though it seems to like to start with some protection. Accumulation of dead material under Tetragonia and Rhagodia may possibly lessen their utility against fire.

Mr. J. H. Maiden, F.L.S., in "The Forest Flora of New South Wales" mentions the Coast Honeysuckle as an excellent tree for sandy coast-lands, while it is also ornamental. If the "cones" are heated at 120° Fahr. the seeds drop out, and can be sown a quarter of an inch deep in leaf soil and sand mixed. As regards ease of ignition, I find it probably not quite so resistant as Coast Wattle, though my tests are not decisive. It occurs among the shrubs of the outer edge, and well-grown trees are sometimes found on the seaward side, as well as amongst the scrub generally. The same work also mentions sheoke as an excellent seaside plant. Its beauty is unaffected by wind; it is propagated from seed. "Physicus," in the *Australasian* (19th August, 1911), called attention to Myoporum (Boobialla) as a neglected hedge-plant, though the example quoted may not have been our common coastal species.

Bursaria has a strong claim to inclusion as scattered trees, on account of its fine show of white and scented flowers at midsummer, and it is not lacking in beauty in fruits and young foliage at other seasons; but it is inflammable, and should be reckoned with the tea-tree in taking precautions against fire.

As to arrangement of planting or preserved shelter, that on the seaward side should evidently be as complete as possible. Necessary access to the beach, either for private or public use, should be by paths with an angle, at least to the extent of a good patch of scrub directly opposite the outer end of a straight short path. Long, straight paths of any sort should be avoided, except perhaps parallel to the coast, and well away from it. A path which comes out obliquely to the beach, but is otherwise straight, is exposed to wind directly from that quarter. Care should be taken of the scrub alongside paths, so that they are not unduly widened. The seaward end of a road that is cleared should have artificial protection with a view to immediate restoration of a block of scrub.

A considerable mixture of non-inflammable plants should be preserved, or introduced where they do not at present occur

in large quantity. Some parts of the scrub should be entirely of fire-resisting plants. Even narrow tracks could be made useful as fire-breaks by belts of suitable vegetation alongside them, and a practice might well be made of separating adjacent allotments by non-inflammable hedges. There is no need to stint the hedge, either in width or height, if it will not burn. The protection of a good hedge facilitates a little garden, which in its turn may add to the security from fire. Careful preservation and planting of suitable native plants could then produce a coastal scrub more diversified, more pleasing in aspect, and safer, and at the same time equally effective for shelter and protection, and as typically coastal and Australian as the present scrub, with its strongly predominant tea-tree.

THE INCUBATION OF THE MUTTON-BIRD EGG.

By JOSEPH GABRIEL.

(*Read before the Field Naturalists' Club of Victoria, 9th March*, 1914.)

DURING the Club excursion to the Furneaux Group of islands, in Bass Strait, in November, 1893 (*Vict. Nat.*, vol. x., p. 167, Feb., 1894), those interesting people, the so-called half-castes, supplied us with some very interesting notes regarding the habits of the Short-tailed Petrels or Mutton-birds, *Puffinus brevicaudus*, Gld., and one of them stated at the time that the incubation of the egg took eight weeks. As he made this statement so confidently I accepted it as correct until a few years ago, when I determined to test the subject myself.

In December, 1911, Mr. Dixon, who resides in the immediate vicinity of "Murray's Rookery," on Phillip Island, kindly consented to watch the birds for me. The rookery having been depleted of its eggs up to 30th November (last day of egging), and as I was there on 3rd December, when there was a bird in nearly every hole, I thought this was a fair chance to get a good result; but my friend's memory failed him, and when he visited the holes he had to calculate the chicks were about a week old, and that the hatching took about a month. As this was not satisfactory, in December, 1912, a friend of mine at Rhyll obligingly placed three eggs in an incubator, with the result that one chick came out in forty-six days; the other two eggs were damaged a few days before, but had dead chicks.

As I was still hungering for better results, on 30th November of last year my incubator friend, Mr. M'Veen, at my request, kindly placed eight eggs under a domestic hen. In due time I received the following note from him:—"Only one out of the Mutton-bird eggs came out; the bird was hatched on forenoon of 15th January. It was a strong, fully-

developed chick, and lived two days. As the eggs were placed under the hen on 30th November, at 8 p.m., the time was forty-six days. Several of the other eggs were broken by the hen; they appeared to contain partially-developed chickens, about the same stage as the one you saw on 27th December. The period of incubation corresponds to our experience with the eggs put in the incubator."

In the past many of our members have taken great interest in the nidification of this wonderful bird, and any additional data is received with interest; so I trust that these notes, when checked by others, will be found to be thoroughly conclusive.

It is extremely difficult to gain authentic data at the rookeries of Phillip Island. The holes during November are so frequently raked out by novices that it is quite possible that eggs may have been passed over in some holes, making the calculation of incubation unreliable. But the eggs which were set under the hen were gathered by myself on 27th November, and were perfectly fresh, as I had been at the same holes two days before and found them empty.

BOOK NOTICE.

AUSTRALASIAN FOSSILS: a Student's Manual of Palæontology. By F. Chapman, A.L.S., Palæontologist to the National Museum, Melbourne. Melbourne: George Robertson and Co. 1914. 340 pp. ($5\frac{1}{2}$ x $3\frac{1}{2}$). 7s. 6d.

IN "Australasian Fossils," the student, or even the casual inquirer, will find another of those handbooks, "written on the spot," which are one by one making known to the scientists of the old world the component parts of our Australian natural history, and which are free from the remarkable statements and misleading illustrations which so often occur in English and American text-books. The volume under notice, in addition to a preface, in which the author calls attention to the plan of the work, has the advantage of an introduction by Professor E. W. Skeats, D.Sc., Professor of Geology in the University of Melbourne, pointing out some of the main facts to be derived from a study of the palæontology of a given area. The work, which has been written with that thoroughness which is so characteristic of the author, is divided into two main parts—General Principles and Systematic Palæontology—the former in separate chapters, dealing with the Nature and Uses of Fossils; Classification of Fossil Animals and Plants; the Geological Epochs; and what objects may be found as fossils, and the kinds of rocks they may be found in. In Part II.—Systematic

Palæontology—chapters are devoted to Fossil Forms of Plants ; Foraminifera and Radiolaria ; Sponges, Corals, and Graptolites ; Star-fishes, Sea-lilies, and Sea-urchins ; Worms, Sea-mats, and Lamp-shells ; Shell-fish, Trilobites, Crustacea, and Insects ; Fishes, Amphibians, Reptiles, Birds, and Mammals. To the student perhaps the most satisfactory feature of the work are the excellent illustrations, no less than one hundred and fifty figures being included, a large number of them being original from the author's own negatives, but the number of figures by no means represents the number of species figured, for many of the blocks contain as many as six species, so that a large amount of ground is covered by the illustrations. Another valuable feature is the series of almost exhaustive references given to previous literature. Taking the chapter on Fossil Foraminifera and Radiolaria as an example of the arrangement of the matter, the author first gives a brief description of the foraminifera and their habits, then refers to the principal fossil forms found in the different strata, commencing with the oldest, where few Australasian forms have been found referring to those of other countries. The Radiolaria are treated in a similar way, each being illustrated with figures in the text. Then follows a list of the characteristic fossils of the chapter, giving name, formation, and (broadly) locality, and lastly, the references to the literature of the subject, arranged under formations. A short appendix on the collection and preservation of fossils contains much practical information for the collector. The work is well indexed—20 pages, double column—a separate locality index being an important feature. An outline map of Australia and New Zealand, giving the principal fossiliferous localities, will be useful to readers at a distance, whose knowledge of Australian geography is often somewhat hazy. The volume is well printed and bound, the cover being impressed with a representation of a giant Victorian Trilobite. That the work will become a recognized authority the world over, and a text-book in Australian universities, there can be no doubt. An excellent portrait of the author appears in the *Australian Book-Buyer* for March.

Wasps' Nests.—A curious choice by some wasps of a place for their nests is given in a recent "Nature Note" in the *Argus*. The empty bowls of some pipes, in a pipe rack hanging on a wall, had been taken possession of by the wasps, each of the bowls being filled with spiders in a stupefied state, and then cemented over with clay in the manner common to these insects.

VOL. XXX.—NO. 1. MAY, 1913.

The Victorian Naturalist:

THE JOURNAL AND MAGAZINE

— OF —

The Field Naturalists' Club of Victoria.

Published 8th May, 1913.

Hon. Editor: F. G. A. BARNARD, Esq.

The Author of each article is responsible for the facts and opinions recorded.

CONTENTS:

	PAGE
THE FIELD NATURALISTS' CLUB OF VICTORIA	1
SOME GENERAL REMARKS ON FERNS, WITH SPECIAL REFERENCE TO VICTORIAN SPECIES. BY F. PITCHER ...	5

*** PRICE SIXPENCE. ***

Obtainable from—Hon. Treasurer, Hon. Secretary, or Hon. Editor.

(FOR ADDRESSES SEE PAGE 3 OF COVER. IF BY POST ½D. EXTRA.)

Agents for Europe:

DULAU & CO., 37 Soho Square, London.

Melbourne:

WALKER, MAY & CO., PRINTERS, 25 MACKILLOP ST.

1913.

The Victorian

AUG 2 3 1933
JUL 2 4 1952
MAY 22 1954

AMNH LIBRARY
100097560